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ABSTRACT

This report describes the development and implementation of a prototype system that integrates a microfiche catalog into an online computer system for bibliographic control. Such a system permits the storage of catalog data not yet converted to digital form, data in ideographic form, data for large numbers of little-used records, and data for use with mini- and micro-computers. The five sections of the report include (1) an overview of the project and a review of the potential for use of microform catalogs as components of computer-based systems; (2) a review of recent developments in the use of such catalogs, including a topically-arranged bibliography and a synoptic analysis of it; (3) an operator's manual which specifies how to use the equipment involved and explains how the machine programs function and interrelate; (4) a description of the programs used in demonstrating the system; and (5) a cost/effectiveness evaluation of the system. (FM)

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THE USE OF AN ON-LINE MICROFICHE CATALOG FOR TECHNICAL SERVICE AND RETRIEVAL OF BIBLIOGRAPHIC DATA

Final Report

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1 April 1979

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IR007953

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THE USE OF AN ON-LINE MICROFICHE CATALOG FOR TECHNICAL SERVICE AND RETRIEVAL OF BIBLIOGRAPHIC DATA

Section 1. Introduction and Overview

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1 April 1979

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ABSTRACT

The purposes of the project described in this Report were (1) to develop a prototype system that integrates a microfiche catalog into an on-line computer system for bibliographic control, (2) to demonstrate its operation, and (3) to analyze its feasibility based on costs and operational data. Such a system permits the storage of catalog records that would be either impossible or, at least, economically unfeasible to store in on-line digital magnetic disk form, especially (1) catalog data not yet converted to digital form, (2) catalog data in ideographic form (Chinese and Japanese, for example), (3) catalog data for large numbers of little used records, (4) catalog data for use with mini-computers and micro-computers.

The primary results of the project are a completely operational facility, including all equipment, software, procedures, and data bases necessary to demonstrate the system, to experiment with it, and to derive data on which to evaluate cost/effectiveness. A secondary set of results provide an evaluation of such data and an evaluation of costs and times for various operations. A set of functional tests can now be performed and are described.

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I. INTRODUCTION

This section of the Report presents a brief overview of the project and a review of the potential for use of microform catalogs as a component in on-line computer based systems for control of bibliographic data. A subsequent section will provide a discussion of the extent to which microform catalogs are now being used in libraries, summarize equipment available for storage and retrieval of data in microform catalogs, and summarize literature relevant to these topics. In this introduction, we will assess the likely significance of this concept.

System Schematic

Before doing so, however, we will first summarize the essential features of the system configuration that is the focus of the research to be reported. Figure 1 is a schematic, showing the three main components:

1) the central computer facility, with its large capacity digital magnetic disk files, its large scale computer, and its associated terminals.

2) the minicomputer system, representative of small-scale facilities that are becoming operational in libraries, with its small capacity digital magnetic disk files, its small scale computer, and its associated terminals.

3) the "on-line" microfiche file, operating as an adjunct to the minicomputer, with its associated display (viewing screen) and manual selector.

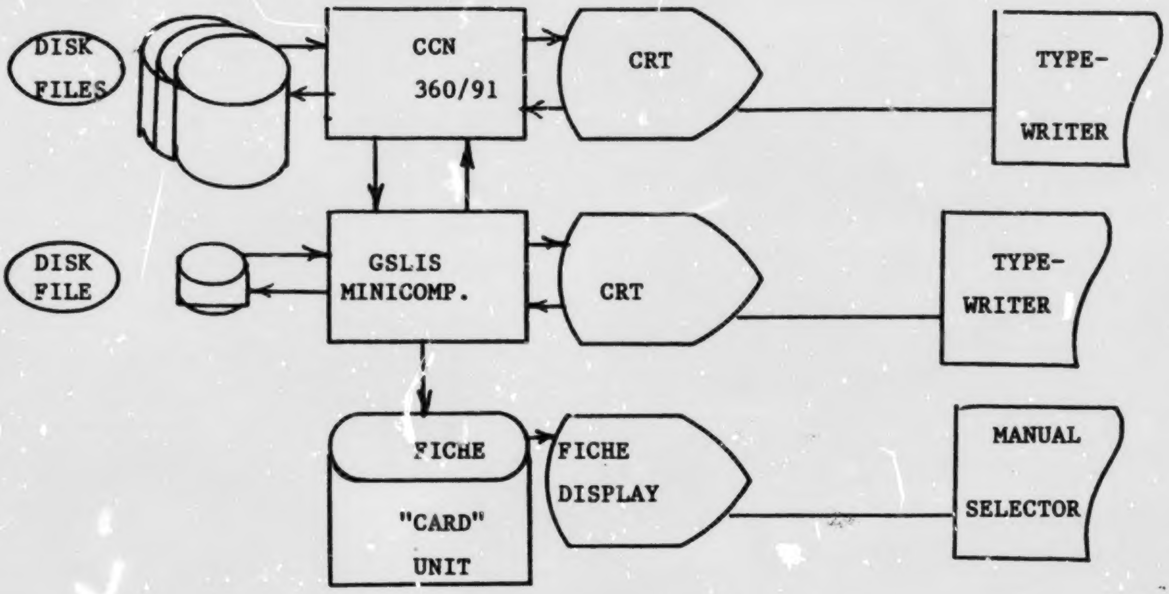
Figure 2 shows pictures of the actual equipment, with all components of the schematic present, except for the central computer facility as such. Several modes of operation can be considered for this set of facilities. For example, considering the two computer components, data can be drawn from large-scale files of the central facility and stored in those of the minicomputer; data stored at the minicomputer can be up-dated, by changes input from the typewriter terminal and then, subsequently, displayed on the local CRT; etc.

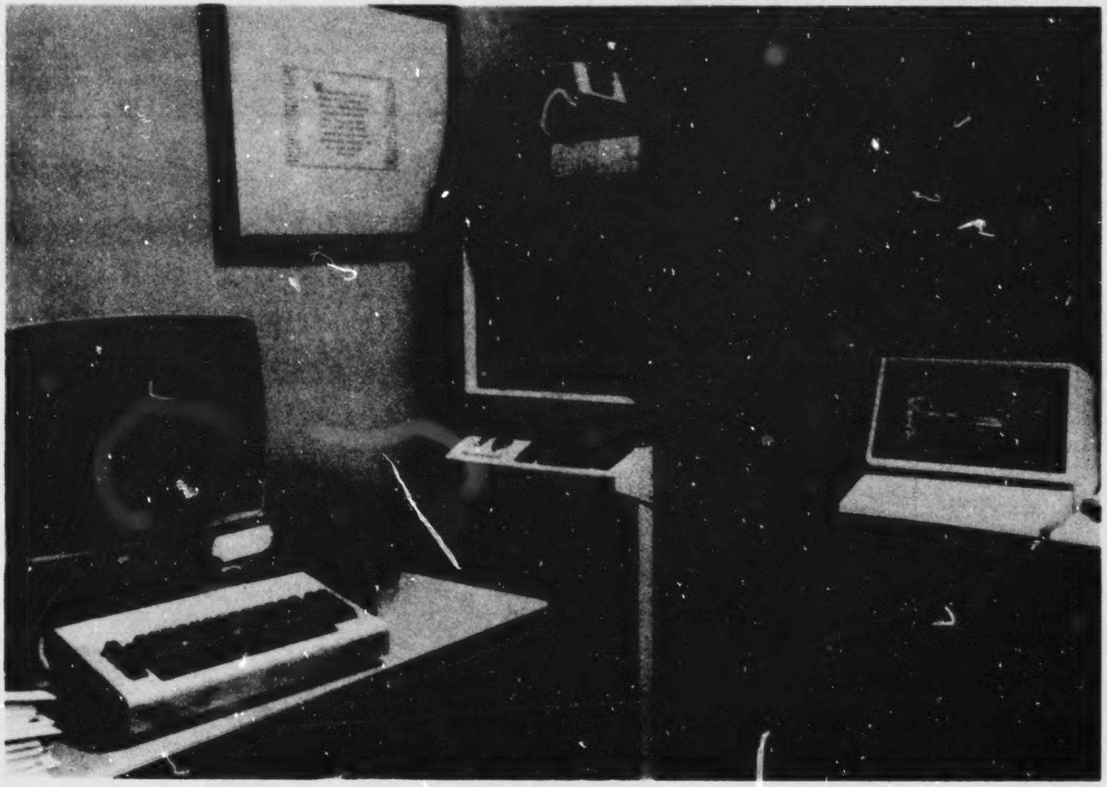
Of special interest, however, are those modes that involve the combination of digital storage and microfiche storage. Specifically, indexes can be stored in the digital files (both the central disks and the minicomputer disks) which identify where bibliographgic data may be stored -- in the central disks, in the minicomputer disks, or in the microfiche unit. A search of those may lead to the display of digitally stored data on the CRT or to the display of a microfiche frame on the fiche display, all under computer control.

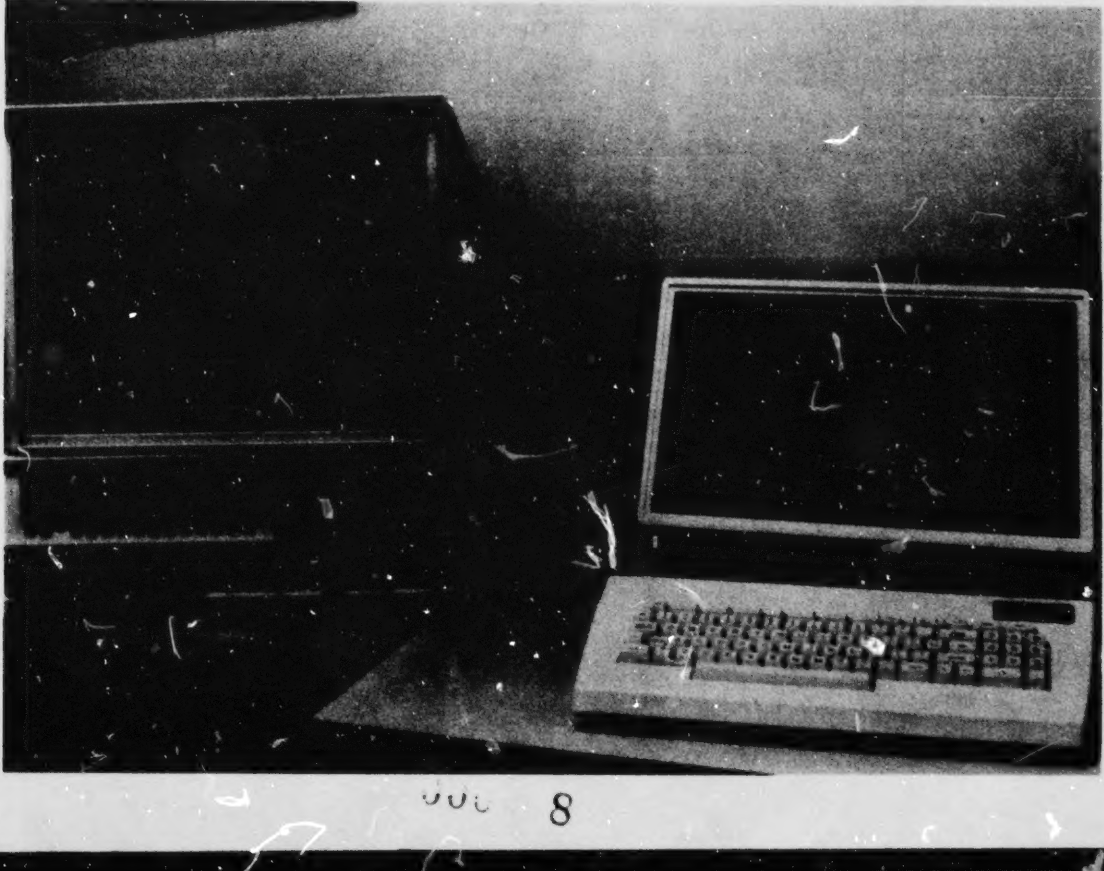
Based upon the data displayed in that mode, changes to the bibliographic data can then be input from the keyboard and stored digitally for later display.

FIGURE I

SYSTEM SCHEMATIC




CENTRAL TERMINAL
DIRECT COMMUNICATION
DIAL-UP
MINICOMPUTER
CRT MONITOR


CARD UNIT
REPLACEABLE CARTRIDGE
CRT TERMINAL

Thus, the combination can turn the usually static microfiche file into a dynamic one, with the fixed fiche data supplemented by CRT display of changes to it.

This configuration of equipment, to the extent that it includes microfiche handling equipment functioning under the control of the computer and incorporates computer indexing and dynamic update of bibliographic data stored on the microfiche, will be called an "on-line microfiche catalog."

The purpose of the research and demonstration project reported here was to show the feasibility of the several modes of operation of this configuration for application to the storage and use of bibliographic data, especially in the form of union catalogs.

Needs

There are several distinct but inter-related needs that can be identified, for each of which such "on-line microfiche catalogs" could serve as answers.

1) The storage of large union catalogs in on-line digital form is extremely expensive, especially in view of the relatively low percentage of such catalog data this is used at any one time. It is clear that such union catalogs are important, as library networks are developed. (An immediate case in point is the union catalog of the University of California. It is a crucial component in the development and operation of the nine campus University Library System. Yet, on-line digital storage of it is extremely expensive.) Alternative means for providing access to such union catalogs need to be explored.

2) The communication of large amounts of bibliographic data is time consuming and expensive, especially in view of the fact that the data is relatively static and only rarely changed as a result of processing.

3) The digital storage of research library catalog data is complicated by the extremely large retrospective conversion required and by the fact that major portions of the data are in non-Roman alphabets and ideographs. Means need to be found to incorporate access to such retrospective files and non-Roman alphabet data into a unified computer-based system.

4) The digital storage of data bases of any significant size is economically unfeasible in present day minicomputer systems. Their disk files are simply too limited in capacity and too expensive to accommodate more than a limited amount of data. Means need to be found that will permit libraries to utilize minicomputers effectively, throughout their operations but especially for processing of bibliographic data.

(5) With significant, if not total, reliance upon computer facilities for access to cataloging data, libraries will face the problem of functioning when the computer is not available. Although the probability of such failure may be small, it is still large enough to be a matter of concern. Means must be found to provide libraries with access to these cataloging data under such circumstances.

In summary, there are at least five needs of major significance to libraries with which this project is concerned:

- What are alternative means for storing and providing access to large union catalogs?
- What are alternative means for communicating and distributing bibliographic data?
- How can such catalogs economically incorporate existing retrospective data and non-Roman alphabet data in a unified system?
- How can bibliographic data be used with minicomputers and microcomputers?
- How can libraries maintain an effective "off-line" access to catalog data when they are using on-line bibliographic systems?

Significance and Impact

The project evaluated the use of "on-line microfiche catalogs" as answers to these five needs. It dealt with the following specific issues:

1) The first is the issue of the relative economics of on-line digital storage vewrsus on-line microform storage. This issue has substantial economic significance; the impact on costs of union catalogs, on retrospective conversion, and on library operations is very great. To illustrate, the University of California Union Catalog is estimated to include about 9,000,000 titles, of which two thirds are not in machine-readable (digital) form. Conversion of the retrospective file is estimated to be, at the least, $10,000,000. If on-line microform storage of that retrospective file was operationally feasible, the cost savings in this union catalog alone, therefore, would be close to $10,000,000.

2) Which brings up the issue of the operational feasibility of on-line microform catalogs. As the review presented in the next section of the report indicates, the number of microform catalogs has dramatically increased over the last several years. Everthing suggests that this trend will continue. Yet, at the same time, the use of computers for cataloging and of other library operations has also been escalating. If these two developments can be brought into an integrated system, there would be substautial gains in operational effectiveness, with reduced operating costs, while meeting the needs identified above.

3) Finally, there is the issue of technical feasibility. Programs were written to provide the operational functions required; catalog data was recorded on microfiche with adequate resolution and readability; operational procedures were established for each of the functions required. Demonstrating that these could all be done in itself has great significance to the evaluation of this approach.

In summary, the results of the study have significance and impact to the extent that they have answered the following three questions concerning the use of on-line microform catalogs to meet the needs identified earlier:

- Is the use of on-line microform catalogs economically feasible and competitive with other alternatives?
- Is it operationally feasible?
- Is it technically feasible?

Objectives

The objectives of the proposed research and demonstration project were to provide concrete and specific answers to those three quesitons.

First, with respect to economic feasibility, the project has evaluated and compared the costs of on-line storage in digital form with that in microform, for equivalent functions. This involved the identification of relevant cost elements, experimental operation of alternative configurations, and accumulation of data concerning costs for each of them. This objective required both an analytical cost model and an experimental confirmation of it based on costs actually experienced. Some of the relevant cost considerations included: (1) storage, (2) computer processing, (3) communication, (4) file conversion, (5) microfiche production, (6) equipment acquisition.

Second, with respect to operational feasibility, the project developed a set of procedures, embodied in a procedure manual, for the basic functions involved in use of on-line microfiche catalogs. These included procedures for current cataloging, for dynamic change in catalog records stored in microfiche, and for bibliographic access to such records. The objective of demonstrating operational feasibility was met by testing those procedures in an experimental environment.

Third, with respect to technical feasibility, computer programs were written both for the large-scale equipment and for the minicomputer to provide the necessary set of functional capabilities. Microfiche were created from COM generated microfiche. And on-line bibliographic files and index files were created.

Applicability of Results

The specific focus of the project was on the use of such on-line microfiche catalogs in support of technical service operations in academic research libraries, especially those involving union catalogs. The results from the project should therefore be directly applicable in that focus.

More generally, it is expected that the results should also be applicable to technical services operations in public libraries. This area of possible applicability is important because of the increasing use of computer-output microfiles (COM) in public libraries. (A specific case in point is provided by the Los Angeles Public Library "in-process file" stored and distributed in the form of COM produced microfiches.) While the summary in the next section of the Report concentrates on academic research libraries, there are probably an equal number of examples from public libraries.

The extension of the results of the project to public services (in contrast to technical services) is likely to be valid in those operations that involve only library professional staff -- such as general reference work and, in particular, inter-library loan. In fact, the purposes of the microform catalogs in network operation are to support those functions.

On the other hand, the extension to public service functions that involve only the library users themselves is much more problematical. There are many problems involved in acceptability, in facility in use, and in the behavior of users faced with catalogs in microform. These problems were not addressed in this project.

II. METHODOLOGY

The project methodology can conveniently be divided into four main tasks.

1. Computer programming
2. File creation
3. Procedural description
4. Experimental operation and data gathering and analysis

Computer Programming

Programs were created for the two computer facilities, a central computer and a minicomputer, including those required for inter-communication between them. For one or the other or for each the following functions were included:

1. Control of the on-line microfiche unit
2. Access to on-line digital cataloging data bases and cross-index files
3. CRT display of catalog data
4. Keyboard input and storage of changes to cataloging records (microfiche and digital)
5. Generation of catalog records, in form suitable for COM production of microfiche, from digitally stored catalog records and stored changes
6. Communication between the two computer facilities.

For each program, documentation has been produced in a form appropriate to communication about it to other facilities.

File Creation

Four sets of files can be created:

1. digital bibliographic records
2. microfiche bibiographic records
3. digital indexes to bibliographic records in both digital form and microform
4. microfiche indexes to the microfiche bibliographic records

The digital bibliographic records were created from MARC formatted tapes in several forms. One was for storage on-line at the central facility;

one, for storage on-line at the minicomputer; one, for storage on tape for subsequent COM production of microfiche. The microfiche bibliographic records were created by COM production from MARC formatted records.

For each form of storage -- digital or microfiche -- digital indexes were created to provide access to specific stored records. These were stored on-line at CCN's central facility and/or at the School's minicomputer. For the microfiche form of storage, microfiche indexes can be created (i.e., certain microfiche frames, designated as index frames, would included entries for each point of access for the microfiche stored records). These would permit the user to operate "off-line."

Section IV of the Report, in addition to providing detail about the programs, also provides a description of the data bases involved. These fall into four groups:

The Fiche File. The fiche file contains the entire catalog of titles, in registry number order, of the University of California at Santa Cruz (with some minor exceptions totalling about 350 titles that were rejected for a variety of reasons).

The entries for this catalog were taken from magnetic type copies of the UCSC Registry File, which were then output in IBM print format tapes ready for COM production. The format chosen was a three column array, as with line numbers inserted between pairs of columns to facilitate locating desired data.

The Registry number sequence was chosen for three reasons:

(1) It avoided the necessity of programming complex filing codes for sequencing of author-title entries.

(2) It minimizes the differences between the fiche display and digital display of the same data. (In contrast, a main entry display would present the viewer of the fiche view with a number of related entries which would bias functional tests heavily in favor of the fiche display.)

(3) It represents the simplest file to update, since additions can be made without the need to re-copy the entire file.

The resulting file of 288,110 entries occupies 107 fiche, with an average of about 14 entries per frame.

The On-line Bibliographic File. In the same processing run that produced the IBM print format tape for COM production, a set of 5,256 entries was selected for on-line storage of the bibliographic data. The selection was based on two criteria:

(1) A "random" selection of every 60th entry, resulting in 4,800 entries. While obviously not a random selection in the strict sense, this served as a means of establishing a large enough file so that meaningful data could be obtained on file parameters, cost of storage especially. Furthermore, it provides a large enough file so that useful functional exercises could be identified.

(2) A set of about 400 entries were specifically identified (by Registry number) to be selected as the basis for testing a variety of cataloging exercises. The exercises are described in Section V of this report, and the Registry numbers of the selected titles are listed there.

It should be pointed out that bibliographic data stored on-line effectively duplicates entries in the fiche file. Such duplication does not represent the way in which the two files will complement each other in an operational situation. Normally, one would expect the on-line data to be additions to the files since the fiche were created and thus not be duplicated in it. However, the purposes of the experimental systems are precisely to experiment, to see what the times, costs, and functional utility of the two alternatives are. So as to eliminate variables due to differences in entries, therefore, identical entries appear in both files. The experimenter can then identify, for each experiment, whether the data are to be presented in fiche form, in digital form, or in a mixture of the two.

The On-line Indexes. Indexes were created at the time the first two data bases were created. They identify where, in each file, the relevant entries are stored for search criteria in the following categories:

(1) Registry number. The UCSC Registry number which is listed in the printed book-form catalog they are presently using.

(2) LC Card number. This is one of the most valuable and used means of access to bibliographic data. Unfortunately, not all of the UCSC source entries contain LC Card numbers (apparently, for a time in maintenance of it, the LC Card number either was not available or was not obtained).

(3) GSLIS number. This is the sequence number in the on-line data base, and provides an especially useful means to retrieve specific entries.

(4) Author and Title Search Codes. These are counterparts of the search codes used in OCLC and thus simulate a typical on-line catalog searching mode.

(5) Author and Title Key words. A file of key words from author names and titles. When used with the capability for boolean connection, these provide means for access comparable to that in BALLOTS, for example. The index entries that have been used in the experiment to date, however, have not utilized these indexes, so all data reported (on file sizes, costs, and operations) do not include this file.

The Change Files. These files are created as a result of experiment. They are of two kinds:

(1) Permanent changes which are introduced by the experimenter and become a permanent part of the file.

(2) Temporary changes which are entered by a person using the files in an experiment. They are retained only as long as an experiment is continued (although that includes carrying them forward from one time of experimentation to a later time, i.e., these changes are retained and are available unless and until the experimenter deletes them).

Procedural Descriptions

A procedure manual is included in this Report describing each of the following operations or functions:

(1) On-line search of the digital bibliographic data base
(2) On-line search of the microfiche bibliographic data base
(3) On-line change to each of them

Experimental Operation and Data Gathering

Cataloging and bibliographic access functions were simulated and experimentally tested in several configurations:

(1) Totally digital storage of bibliographic data
(2) Digital access to microfiche bibliographic data
(3) Mixed digital and microfiche access

For each configuration the following data were acquired:

(i) costs in each of a set of identified categories

(ii) operating time

Functional tests have not yet been made. They are planned, to include tests of:

(a) Current cataloging of current material

(b) Current cataloging of non-current material

(c) Acquisitions decisions requiring union catalog search

(d) ILL decisions involving union catalog search

For each of the various tasks, specific data were acquired as the basis for subsequent analysis and reporting of the results.

Computer Programs. Data was acquired on the operating time and cost and extent of memory utilization of the programs. For this purpose, a set of standard bench-marks were established, designed to test the program functions; the program was monitored during running for reporting of the relevant data. Bench-marks include tests of the following functions: (1) keyboard input, (2) boolean nesting, (3) index search, (4) file search, (5) fiche display, (6) CRT display, (7) keyboard output.

File Creation. Cost data were acquired based on the cost of computer- output microfilming, cost of fiche production, and cost of computer processing for creating COM source data tapes.

Experimental Operation and Data Gathering

This provides the basic source of data for evaluation of operational feasibility.

The procedure followed in acquiring these data were as follows:

(1) A set of "searches" were established. Some of the searches were designed so that the bibliographic data would be found only in the digital file; for some, only in the microfiche file; and for some, in both.

(2) Each "search" was run against the system following the procedures defined in the procedural description. A project analyst observed the entire sequence of clerical steps and recorded relevant data about each of them, using a standard form. This standard form permitted the project analyst to identify the component, operation, number of times performed, size, frequency and rate, time and cost of each operation.

Comparison with Objectives

At the initiation of this project, several general and specific objectives were intended. It is of value to review them and to show to what extent they have been met.

(1) Evaluation of Economic Feasibility. This general objective has been met and the relevant data are presented in Section V. Some specific objectives in this respect were as follows:

- Develop an analytical cost model. This has been done and is presented in Section V.
- Experimentally confirm it, based on costs actually experienced. This has been done and is presented in Section V.
- Include, as relevant cost considerations: (1) storage, (2) computer processing, (3) communication, (4) file conversion, (5) microfiche production, (6) equipment acquisition. All of these have been explicitly covered.

(2) Evaluation of Operational Feasibility. This general objective has been met except for one specific objective. The specific objectives were:

- Provide procedures for access to records. This has been completed and the results presented in Section III of this Report.
- Develop operational procedures for use of and change of bibliographic data. This has been completed and the results presented in Section III of this Report.
- Provide procedures for creating new microfiche records. This has not yet been done, although the programs for doing so are operational. All that is required is to introduce changes and new records, merge them into the existing master file, and create a new IBM print format tape for COM production. These appear to be straightforward analogues of the processes involved in creating the original data bases, but they have not actually been performed.

(3) Evaluation of Technical Feasibility. This objective has been met in major part, but two specific objectives have not yet been met.

- Create programs for large-scale equipment and for a minicomputer to provide functional capabilities. This has been completed, and the programs are described in Section IV.
- Create microfiche from COM. This has been completed, for a full Registry catalog of a sizeable collection.
- Create microfiche from direct photography of pages from existing printed catalogs. This has not yet been done. Although there are not identifiable problems in doing so, there simply were tasks of higher priority.
- Evaluate readability of images. This has not yet been done. Again there are no essential problems in doing so, and measurements of resolution will be made.

There were also some tasks that were specifically identified, and it is worthwhile to review the extent to which they have been carried out.

(4) Computer Programming Tasks. All of the identified tasks have been completed, and programs are operational for each of the functions:

- Control of the on-line microfiche unit.
- Access to on-line data bases and index files.
- CRT display of catalog data.
- Input and storage of changes to both fiche and digital data bases.
- COM production of microfiche.
- Communication between computer facilities.

(5) File Creation. All but one of the identified tasks has been completed.

- Digital bibliographic records were created and stored on-line.
- Microfiche bibliographic records were created and stored in the microfiche CARD unit.
- Digital indexes to both were created and stored on-line.
- Microfiche indexes for microfiche storage were not created. The data for them are available and ready for COM production of fiche, but they have not yet been output.

(6) Procedural Descriptions. Three of the five identified tasks have been completed.

- Procedures for on-line search of the digital data base have been defined.

- Procedures for on-line search of the microfiche data base have been defined.
- Procedures for change to either of them have been defined.

However, for the following two tasks, procedures have not been defined:

- Off-line search of microfiche data base.
- Creation of new microfiche records from the digital files.

(7) Experimental Operation and Data Gathering. The system was to be experimentally tested on several functions. To date, the functions tested have been limited to the operational functions -- request formulation, communication search, display, and change of stored bibliographical data. A set of functional tests in the area of cataloging *per se* have been defined.

(8) Data Analysis and Evaluation. These tasks have been completed for the operational functions.

(9) Reporting and Dissemination. This final Report represents the completion of this task. Papers have been presented as follows:

- ORSA/TIMS oint National Meeting 13-15 November 1978 "Cost/effectiveness evaluation of alternative mean of access to cataloging data."
- Missouri State Library Meeting 18-19 December 1978 "A statewide data base of bibliographic records for Missouri Libraries."
- Inter-University Center, Dubrovnik, Yugoslavia, to be presented 15-25 May 1979 "On-line Microfiche in a Distributed Information Network."

Other papers are in process of preparation for submission to journals.

III. SUMMARY

Background

In Section II of this Report, data is provided about the present use of microforms in libraries. It is based on published articles, summarized in an extensive bibliography and analyzed by type of functional application. It includes a discussion of some issues relevant to the use of microforms and a summary of types of equipment.

System Operation

In Section III of this Report, an Operator's Manual is provided. It covers operation of the hardware; it describes the successive steps in use of the system, from initiation of operation to the formulation of requests, to the searching of files and displaying of retrieved records, to the input of changes to records. It includes a listing of "error messages," output from the minicomputer, that identifies what kind of error each message represents and what the operator or programmer needs to do to deal with it.

Programs

Section IV of the Report is the largest in size and represents the major technical work on the project. It presents three groups of programs:

(1) Those written for the minicomputer. They provide the capability for accepting requests, transmitting them to a central computer, receiving data retrieved from the central computer, storing those data, finding them and displaying them upon command, controlling the microfiche CARD unit, accepting changes to the stored data, and transmitting the changes to the central computer. These programs are described in both general terms and specific to their implementation in assembly language.

(2) Those written for communication between the minicomputer and the central computer on campus. These programs involve both computers as well as the interface between them. They provide capability for automatic sign-on, under TSO, automatic transmission of data files both

ways between the two machines, automatic validation and check of the data transmitted, and automatic error recovery. These programs were written in assembly language for each of the two machines.

(3) Those written for the central computer. They provide for creation, search, and change of the centrally stored data bases. They include, specifically, the programs for creation of the output tapes from which the microfiche were produced by COM, for creation of the on-line data base and its indexes, for deciphering search requests received from the minicomputer, for searching the central data base and retrieving requested records for incorporating changes into the central files. These programs were written in PL/I.

Data Analysis

Section V of the Report presents the cost model and the analysis of data from operational test with context of it.

Functional Test

Section V of the Report presents the details of functional tests in the area of cataloging, together with a listing of the entries selected for on-line storage for purposes of actual testing.

THE USE OF AN ON-LINE MICROFICHE CATALOG
FOR TECHNICAL SERVICE AND RETRIEVAL OF BIBLIOGRAPHIC DATA

Section II. Microforms & Libraries

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1 April 1979

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I. INTRODUCTION AND SUMMARY

II. BACKGROUND

Review of developments in the use of microform catalogs

Some unanswered questions

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IV. ANALYSES

I. INTRODUCTION

There has been a significant increase in recent years in the use of microform catalogs in libraries. This development has been occasioned in large part by the low costs and ease of distribution associated with producing a catalog on microform. Concurrently, there have been important technical improvements in the equipment available to select and display microforms, from inexpensive briefcase sized portable viewers to interactive T. V. display systems. However, since these developments in the use of microform based catalogs have occurred primarily in an operational context, relatively few systematic evaluations have been reported.

The primary objective of this section of the Report is to establish a context for evaluation of the feasibility of microfiche as a medium for online storage of bibliographic data. Because of the low costs and ease of distribution of microfiche, this medium is an economically attractive means of providing access, especially to union catalog information. In addition, microfiche catalogs offer other benefits that could be especially significant.

Microfiche catalogs can be produced from direct photographic procedures, thus providing an inexpensive alternative to retrospective machine readable conversion for producing and distributing a union catalog of records directly from their printed form. Georgia Tech, for instance, has successfully integrated a catalog that was filmed from the card file using a rotary camera with a supplement that is produced via COM. Both catalogs are on fiche at 42X. Estimated cost of filming the base catalog was less than $0.01 per record for direct labor. Microfiche catalogs can contain non-keyable scripts, such as non-roman alphabets or graphic information, thus accommodating more types of bibliographic records than is possible when records must be computer processed. This could be a significant advantage for a catalog potentially as rich and diverse as a University union catalog.

Summary of the Section

The remainder of this section of the Report will provide a review of recent developments in the use of microform catalogs, a bibliography of relevant material, arranged topically, and a synoptic analysis of that bibliography.

II. BACKGROUND

Review of Developments in the Use of Microform Catalogs

In a review of the literature completed in 1973, Robert Greene[1] was able to locate information on only 8 microform catalogs. By the end of 1975, however, there were published reports on the use or development of more than 40 microform catalogs, including 5 national union catalogs, 5 state catalogs, 4 university wide or inter-university union catalogs, 11 academic institutional catalogs, 10 union catalogs for regions smaller than a state and 5 special library catalogs. And by 1979, the totals had grown to 9 national union catalogs, 9 state catalogs, 7 inter-university, 36 academic institutional catalogs, 35 regional catalogs and 11 special library catalogs. Table 1 summarizes the reported use of microform catalogs by library type. Undoubtedly, there are many other microform catalogs in use in libraries that have not been reported in the literature surveyed for this report. In particular, there are two commercially available microform catalogs -- Information Dynamics Corporation's MCRS and Information Design's CARDSET both of which could qualify as national as national union catalogs which are in use in the processing departments of over 60 libraries.

The primary reasons for using microform catalogs are reported to be lower cost and ease of distribution. The advantages of microform catalogs have been stated succinctly by A. J. Crowe of the Shropshire, England, County Libraries.

> Our view is quite simple. Our branch libraries did not have a catalogue of any type; the area libraries had only an alphabetical author catalogue of the area stock. Now they are all getting author and classified union catalogues of the whole of the County stock continually updated with locations. Compared with that, the fact that they must use a machine that's up to now not been in habitual use by library users is totally irrelevant.[2]

The experiences at several of the libraries where microform catalogs have been employed are directly relevant to a university union catalog. The following information, where available, has been summarized for each reported microform catalog:

TABLE I

SUMMARY OF LIBRARIES OR LIBRARY SYSTEMS REPORTED TO BE EMPLOYING MICROFORM CATALOGS, 1970-1979

System	Number of Reported MF Catalogs	
	1975	1979
1. National Union Catalogs or Collections of Major Catalogs for National Coverage	5	9
2. State Wide Union or Collections of Major Catalogs for State Wide Coverage	5	9
3. University Wide or Inter-University Union	4	7
4. College, Research, University Library	11	36
5. Union Catalog for Units Smaller	10	35
6. Special Library	5	11
TOTAL	40	107

1. Systems in which it is used.
2. Size of the catalog.
3. Record contents.
4. Nature of the microform output.
5. Update procedures.
6. Production process.
7. Equipment used.
8. Costs.
9. User reactions.
10. Comments by authors.

Some Unanswered Questions

Despite the fairly widespread use of microform catalogs, several important issues remain unresolved.

1. User reactions. In general, the literature has focussed on the advantages of microforms, particularly the low costs, ease of update, and the potential for wider distribution. Reports of user reactions have consisted primarily of the subjective perceptions of administrators and/or system designers that the microform catalog is acceptable to, or favorably received by the patrons. Although there were only two negative reports of user reaction to a microform catalog,[3] one must ask how many failures or serious problems remain unreported.

In 1974, John Spencer, research officer for the National Reprographic Center for Documentation in England, suggested that user acceptance of microform catalogs is an area requiring a great deal more research. However, except for Greene's[4] evaluation of Georgia Tech's microfiche catalog, and the work at NYPL,[5] there has been almost no systematic analysis of user reactions to microform catalogs. There have been some extensive investigations of user reactions to microform texts,[6] but several investigators[7] have suggested that the nature, purpose and use of microform catalogs are likely to evoke a different response from patrons.

Complicating this issue is the fact that what user studies there are usually have focussed on comparisons between microforms and some other version of the catalog (book or card). When the choice is couched in such terms, users react as might be expected -- they prefer a printed version.[8]

The need therefore is to identify the design requirements for a microform catalog that is acceptable to users on its own terms, not in comparison with other media.

2. Fiche vs. Film. There is debate over which kind of output -- film or fiche -- is best for library catalogs. Fiche files tend to be slightly less expensive to maintain because the required readers are less costly and

no cassette or cartridge is needed. Fiche are also more flexible and provide faster access than film. Those who have argued against fiche[9] have cited their concern over the problems of maintaining file integrity when large numbers of fiche are involved.

Georgia Tech, on the other hand, has an 800+ fiche file and reports that none of the expected difficulties has materialized.

> Extensive comparison and testing of the self-indexing microfiche approach with mechanized systems and external indexes leaves us convinced that the microfiche system has greater reliability, is simpler to understand and use, and provides as fast or faster access, as well as requiring less expensive readers. The only real advantage for this application which we can see in mechanized cartridge readers is file integrity. So far, however, we have no reported problems from the loss or misfiling of fiche.[10]

It must be noted, however, that Georgia Tech library patrons are technically oriented and often have extensive experience with fiche documents.

Resolution of this issue in itself requires further research, so this study has limited its focus to the evaluation of microfiche rather than trying to compare the various microform technologies.

Microform Retrieval Technology

There is a range of equipment available for microform retrieval, from hand cranked viewers using printed indexes to computer linked direct access storage and display devices using disc stored indexes. Measured times for locating specific items on microforms range from 2 minutes to 3 seconds.[11] Normally, costs and speed of retrieval are inversely related within a given form of output (fiche or film). This is an evolving field of technology, however, and it is unwise to make definitive statements about the very latest techniques available. Certain patterns and techniques have been with us for some time though, and it is useful to review these.

1. Serial vs. Direct Access. Microfiche, like computer disc packs, have the advantage of permitting direct access storage. Microfilm, like computer tapes, must be searched serially. This means that microfiche will inherently be a faster, more flexible medium to search, other elements of the retrieval process being equal. The tests conducted at the NYPL[12] indicated that the

time required to search microfilm can be a problem to a researcher making extensive use of the catalog. This problem is further exacerbated in a technical processing context in which time required to locate items is an integral part of production rate.

2. Indexing. A variety of techniques for indexing microforms have been developed. For microfilm the basic options are:

a. Large characters placed at the bottom of each page or between pages to enable rapid scanning of the film.

b. Odometers which indicate by some measuring device the specific point in film being viewed. These must be used in conjunction with separate indexes.

c. Page counters which count each page as it passes the screen. These also must be used in conjunction with separate indexes.

d. MIRACODE, the most complex film indexing technique. Coding bars inserted between pages on the film contain data on several variables that describe the information on each page. This system allows multivariable searches of records, but the file must be examined serially.

For microfiche, the basic options are:

a. Eye readable characters at the top of each fiche and/or bottom of each column.

b. Column and row indexes which indicate the location of specific pages in a given fiche.

c. Edge notched coding.

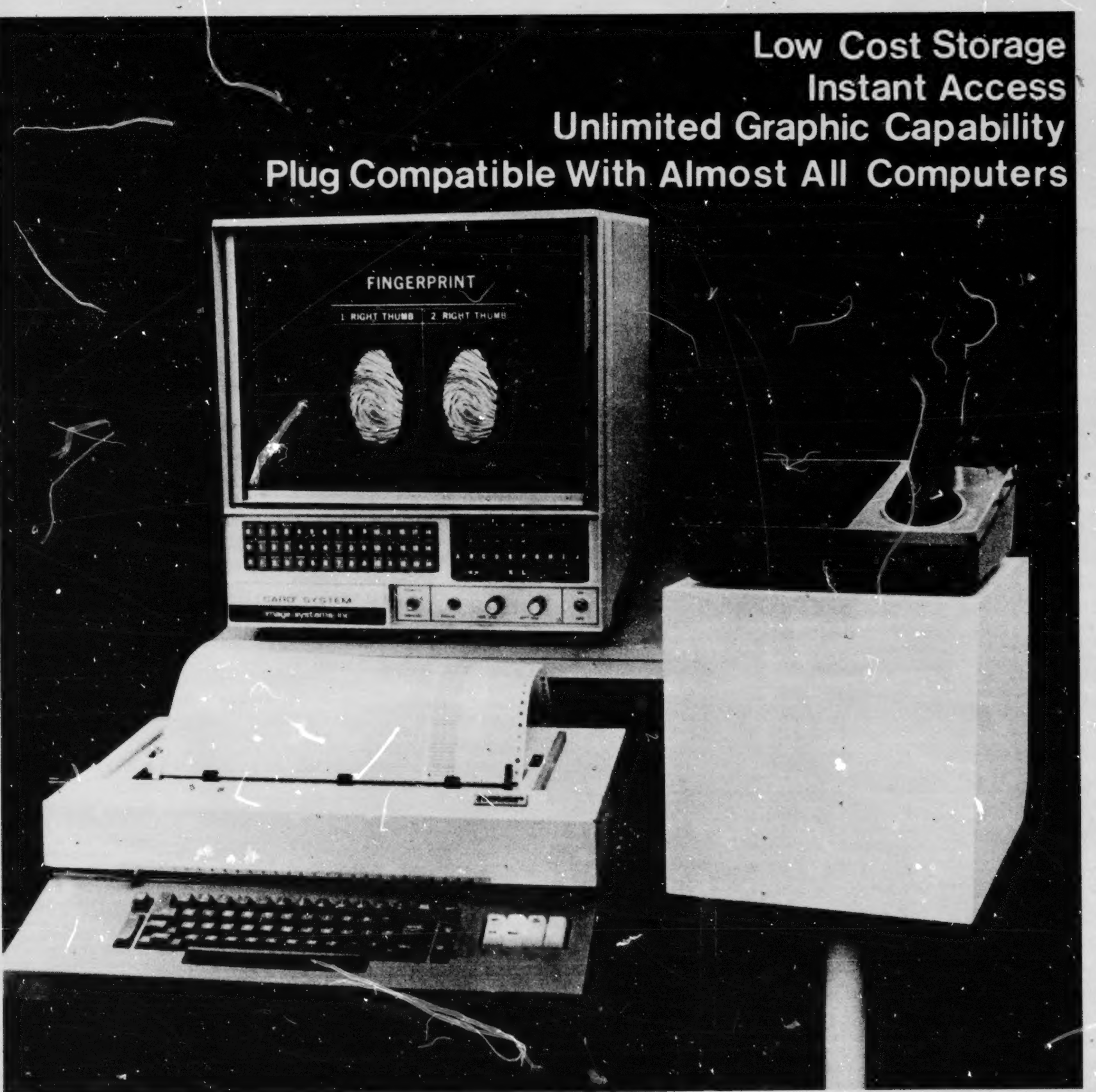
3. Retrieval equipment. Equipment designed to provide high speed retrieval of microforms has become more sophisticated in recent years. Beginning with the Rapid Selector, developed by Ralph Shaw for the National Bureau of Standards in the '40s, microform retrieval and display devices have grown continually in number and complexity. The Kodak Recordak, which uses MIRACODE, is one such example. Others include such items as the Bruning Model 95 that can select and display within 1-4 seconds a particular page image stored in a cartridge that holds 30 fiche, and the Sanders-Diebold system that transmit a T.V. image of a record stored in a file of 49,000 microforms in a variety of formats. Each of these advanced microform retrieval devices has its own special operating capabilities, thus making direct comparisons difficult.

In this project we have focussed on one particular unit -- the Image Systems CARD reader. Its capabilities are summarized in the following data sheet from the manufacturer. Its relatively large file capacity and its ability to be integrated with computer controlled file searching, make it especially attractive for bibliographic use in the library.

COMPCARD™

Computer Controlled Microfiche Retrieval

image systems
image systems
image systems
image systems
image systems
image systems



Low Cost Storage
Instant Access
Unlimited Graphic Capability
Plug Compatible With Almost All Computers

Features and Specifications

CARD is a low-cost automatic microfiche storage and retrieval system that holds up to 780 microfiche at reductions between 20X and 42X and displays any page of information in three seconds or less. The microfiche are individually identified by an attached binary coded metal clip, which allows random storage and access. In manual mode, microfiche images are retrieved by pressing five pushbuttons on the front keyboard.

The CARD Computer Interface permits the CARD unit to be directly controlled by a computer. As a result, more than a billion characters per COMPCARD unit are made available for on-line display to an operator. This extensive capacity reduces the storage, transmission, and programming loads for many computer systems and makes minicomputers more effective for many applications. Graphic capabilities are an added bonus.

REDUCES STORAGE REQUIREMENTS – COMPCARD takes large volumes of relatively static information out of expensive computer storage and puts it on low-cost microfiche.

REDUCES TRANSMISSION LOAD – Relatively fixed data can be distributed and stored on microfiche at each COMPCARD terminal. No more than eight characters are ever required to select any page of information, each containing up to 8,000 characters. This 1,000:1 reduction can save a time-share system from bogging down in its own transmission requirements.

REDUCES PROGRAM COMPLEXITIES — COMPCARD minimizes core and disk storage, and thus overlay and data shuffling requirements. By reducing transmission load, it also reduces queuing and data concentration requirements. In addition, COMPCARD reduces operator keystrokes and saves on translation, error checking and correction and print routines.

GRAPHIC CAPABILITY – COMPCARD can store either alphanumeric or graphic information or both. Information can be in the form of charts, maps, photographs . . . in black-and-white or in color.

FUNCTIONAL CHARACTERISTICS

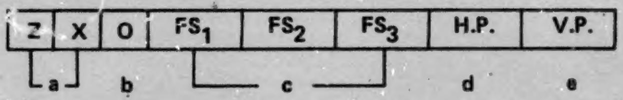
COMPCARD can be connected either directly to the computer or remotely via a telephone line and dataset (modem). A "receive only" terminal system, it is used in conjunction with an interactive computer terminal (teletype, CRT, etc.). COMPCARD uses exactly the same set of lines and datasets as the interactive terminal in the receive mode. A Computer Control/Manual switch allows COMPCARD to function alternatively as a stand alone microfiche storage and retrieval system. In this mode, power may be removed from the CARD unit without affecting the operation of the terminal.

DATA LINE REQUIREMENTS

The COMPCARD interface is designed for bit serial information: COMPCARD is compatible with devices that are plug-compatible with IBM 2740 units (using IBM Correspondence Code), or eight-level ASCII code, or EBCDIC. The interface can be equipped for either RS 232 C or "current loop" input/output signals. Baud rates from 75 through 9600 are field selectable.

MESSAGE FORMAT

COMPCARD accepts messages consisting of a two-character initiate field, a one-character field for selecting one of a number of COMPCARD units, and a five-character field that contains the selection information. The message format is:



a. Two character initiate field
b. CARD unit selection number (0 through 15)
c. Fiche selection field
d. Horizontal position
e. Vertical position

SPECIFICATIONS:

Size:	48 cm H x 45 cm W x 63.5 cm D (19" H x 18" W x 25" D)
Weight:	43.5 kg (96 pounds)
Power:	115 VAC, 60 Hz or 220 VAC, 50 Hz (Other power requirements available)
Screen Display Size:	28 cm H x 35.5 cm W (11" H x 14" W)
Controls and Indicators:	Power (on/off) Power Focus Vertical and Horizontal Image Adjustment Computer Control/Manual Selection Switch
Additional Features:	Selectable odd/even parity Selectable parity inhibit Automatic detection of transmission errors

Sold and serviced through a comprehensive worldwide dealer network.

For further details, call or write:

Image Systems, Inc.
P.O. Box 2488
11244 Playa Court
Culver City, CA 90230
Telephone: (213) 390-3378
Cable: IMAGELACAL
TWX: (910) 343-6465

III. BIBLIOGRAPHY

The references cited here are organized topically. Works that are of general interest to this project are listed first. Next come references to specific microform catalogs, arranged by categories (e.g., National Union Catalogs, State Wide Catalogs, etc.).

WORKS OF GENERAL INTEREST

Ballou, Hubbard W. "Microform Technology." ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY, V. 8. Washington, D.C.: American Society for Information Science, 1973.

Becker, Joseph. "Computer Output Microfilm for Libraries." UNESCO BULLETIN FOR LIBRARIES, 28 (1974), 242-244+.

Bierman, Kenneth. "Automated Alternatives to Card Catalogs: The Current State of Planning and Implementation." JOURNAL OF LIBRARY AUTOMATION, 8 (December 1975), 277-293.

Bolef, Doris. "Computer-Output Microfilm." SPECIAL LIBRARIES, 65 (April 1974), 169-75.

Bullock, Connie; et al. STATE OF THE ART AND ALTERNATIVES (SUBGROUP B; INTERIM REPORT). Los Angeles, California: University of California, Library, July 1972. EDRS: ED-121-324.

Bush, Vannevar, ENDLESS HORIZONS. Washington, D.C.: Public Affairs Press, 1946.

Dranov, Paula. MICROFILM: THE LIBRARIANS' VIEW, 1976-77. White Plains, New York: Knowledge Industry Publications, Inc., 1976.

Elrod, J. McRee. "Is the Card Catalogue's Unquestioned Sway in North America Ending?" JOURNAL OF ACADEMIC LIBRARIANSHIP, 2 (1976), 4-8.

Freedman, Maurice. "Automated Network Catalog Products and Services." JOURNAL OF LIBRARY AUTOMATION, 9 (June 1976), 145-55.

Freedman, Maurice J. "The Economics of Book Catalog Production." 1976 CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING PROCEEDINGS, held at Urbana-Champaign, Illinois, 25-28 April, 1976. Urbana-Champaign, Illinois: University of Illinois, Graduate School of Library Science, 1977. 107-121.

Friedman, Elaine S. "Library Applications of Computer Output Microfilm: An Annotated Bibliography." SPECIAL LIBRARIES, 68 (December 1977), 447-454.

Gildenberg, Robert F. COMPUTER-OUTPUT-MICROFILM SYSTEMS. Los Angeles: Melville, 1974.

Griffith, J.C. and Hayes, Robert M. THE USE OF A MICROFICHE CATALOG FOR PUBLIC SERVICE AND ON-LINE RETRIEVAL OF BIBLIOGRAPHIC DATA. Los Angeles, California: University of California, Graduate School of Library and Information Science, 1 June 1976. EDRS: ED-125-665.

Johnston, R.J.D. "Experimental On-line Retrieval System Using Ultrafiche." PROGRAM, 9 (April 1975), 56-63.

LIBRARIES AT LARGE, Douglas M. Knight and E. Shepley Nourse, ed., New York: Bowker, 1969.

"Libraries Expand Use of COM Catalogs." ADVANCED TECHNOLOGY/LIBRARIES, 6 (February 1977), 1-3.

Library of Congress, Photoduplication Service. SPECIFICATIONS FOR 16 MM MICROFILMING OF LIBRARY CARD CATALOGS. Washington, D.C.: U.S. Government Printing Office, Superintendent of Documents (Stock Number 3000-00073), 1974. EDRS: ED 135-349.

LIBRARY TECHNOLOGY REPORTS. Chicago: American Library Association.

"Los Angeles and Cook Co. Switch to COM." LIBRARY JOURNAL, 103 (1 January 1978), 10.

Malinconico, S. Michael. "The Economics of Computer Output Media." 1976 CLINIC ON LIBRARY APPLICATIONS OF DATA PROCESSING PROCEEDINGS, held at Urbana-Champaign, Illinois, 25-28 April, 1976. Urbana-Champaign, Illinois: University of Illinois, Graduate School of Library Science, 1977. 145-162.

"More Libraries Switch to COM Catalogs." LIBRARY JOURNAL, 102 (15 March 1977), 672-673. 101 (1 November 1976), 2213-2214.

New, Peter. REPROGRAPHY FOR LIBRARIANS. London: Bingley, 1975.

Nozik, Barbara A. ALTERNATIVE PHYSICAL FORMS FOR LIBRARY CATALOGS: CARD, BOOK, MICROFORM, ON-LINE (A working paper prepared for the Subcommittee on the Future of the Catalogs). Berkeley, California: University of California, Libraries, July 1974. EDRS: ED-122-795.

Petrie, J.H. and Ede, S.J. "The Microfilming of Library Catalogs." BRITISH LENDING LIBRARY REVIEW, 2 (April 1974), 53-60.

Recon Pilot Project. RECON PILOT PROJECT. Washington, D.C.: Library of Congress, 1972.

Recon Working Task Force. CONVERSION OF RETROSPECTIVE CATALOG RECORDS TO MACHINE READABLE FORM: A STUDY OF THE FEASIBILITY OF A NATIONAL BIBLIOGRAPHIC SERVICE. Washington, D.C.: Library of Congress, 1969.

Recon Working Task Force. NATIONAL ASPECTS OF CREATING AND USING MARC/RECON RECORDS. Washington, D.C.: Library of Congress, 1973.

Saffady, William. MICROGRAPHICS. Littleton, Colorado: Libraries Unlimited, Inc., 1978.

Salmon, Stephen R. "User Resistance to Microforms in the Research Library." MICROFORM REVIEW, 3 (1974), 194-199.

Schwarz, Philip. (Letter in reply to W. Saffody). JOURNAL OF LIBRARY AUTOMATION, 8 (March 1975), 79.

Scott, A.D. "Catalogue Use: Staff Talking." NEW LIBRARY WORLD, 76 (May, 1975), 93-94.

Spaulding, Carl M. "A Primer on COM (Computer Output Microfilm), An Alternative to Computer Printout." AMERICAN LIBRARIES, 7 (July-August 1976), 468-469.

Spencer, Herbert and Reynolds, Linda. FACTORS AFFECTING THE ACCEPTABILITY OF MICROFORMS AS A READING MEDIUM. (U.K.): Royal College of Art, Readability of Print Research Unit, February 1976.

Spencer, J.R. APPRAISAL OF COMPUTER OUTPUT MICROFILM FOR LIBRARY CATALOGUES, the Final Report of the Findings and Work of an Investigation from December 1971 to July 1973. Hatfield, Hertfordshire, England: National Reprographic Centre for Document, 1974.

Spencer, John R. "Research Programmes." COM APPLICATIONS IN LIBRARIES: PAPERS GIVEN AT A SEMINAR ON THE USE OF COMPUTER OUTPUT ONTO MICRO FILM BY LIBRARIES, held by the Microfilm Association of Great Britain, University of Aston, Birmingham, 4th July, 1973. William D. Linton, ed. Guilford: Microfilm Association of Great Britain, 1974. 15-20.

Teague, Sydney John. MICROFORM LIBRARIANSHIP. Boston, Massachusetts: Butterworth and Co., 1977.

United States. General Services Administration. National Archives and Records Service. Office of Records Management. RECORDS MANAGEMENT HANDBOOK. MANAGING INFORMATION RETRIEVAL. COMPUTER OUTPUT MICROFILM. Washington, D.C.: Government Printing Office, 1975.

United States. General Services Administration. National Archives and Records Service. Office of Records Management. RECORDS MANAGEMENT HANDBOOK. MANAGING INFORMATION RETRIEVAL. MICROFORM RETRIEVAL EQUIPMENT GUIDE. Washington, D.C.: Government Printing Office, 1974.

Vervliet, H.D.L. "Alternative Physical Forms of Catalogues in Large Research Libraries." INTERNATIONAL CATALOGUING, 6 (January/March 1977), 6-8.

Williams, B.J.S. "Reprographics." BRITISH LIBRARIANSHIP AND INFORMATION SCIENCE 1971-1975. H.A. Whatley, ed., London, England: The Library Association, 1977. 84-90.

Zimmerman, R.G.J. "A Computer Accessed Microfiche Library." JOURNAL OF LIBRARY AUTOMATION, 7 (Dec. 1974), 290-306.

NATIONAL UNION CATALOGS AND COLLECTIONS OF MAJOR CATALOGS FOR NATIONAL COVERAGE

Australia

"Australian Union Catalog On Microfilm." UNESCO BULLETIN FOR LIBRARIES, 29 (March 1975), 108.

Sanders, Glenn. "Fear and Loathing in the Union Catalogue or Electric SALSSAH Rides Again." LASIE (LIBRARY AUTOMATED SYSTEMS INFORMATION EXCHANGE). 7 (March/April 1977), 28-40.

Belgium

Goedeme, G.; Goossens, P. and Heymans, F. "The Belgian Union Catalogue of Periodicals." INFORMATION PROCESSING & MANAGEMENT, 12 (1976), 161-164.

__________. "De Centrale Catalogus Van Buitenlandse Tijdschriften: Een Supplement op Microfiches (The Central Foreign Periodicals Catalogue: Microfiche Supplement)." BIBLIOTHEEKGIDS, 51 (April-June 1975), 75-79.

Rhodesia

"Periodicals in Rhodesian Libraries." RHODESIAN LIBRARIAN, 7 (Apr. 1975), 31.

Scotland

Royan, Bruce. "SCOLAP - But I Thought That Was An Online System?" MICRODOC, 16 (1977), 82-84+.

Thorton, P. "Computerized Scottish Union Catalog." SLA NEWS, (July 1973), 283-285+.

South Africa

Aschenborn, H.J. "South African UNICAT: the New Union Catalog of Monographs in South African Libraries on Microfiche." INSPEL 9, (1974), 5-23.

______________. "UNICAT: the South African Joint Catalogue of Monographs on Microfiche." MICRODOC, 11 (1972), 76.

______________. "The Use of Microfilm in South African Libraries. JOURNAL OF MICROGRAPHICS, 6 (Sept-Oct 1972), 33-37.

"Microfiche ISBN Catalog Published in Africa." LIBRARY JOURNAL, 97 (Oct. 1972), 3108.

"South Africa Library Puts Catalog on Microfiche." LIBRARY OF CONGRESS BULLETIN, 31 (August 1972), 378.

United Kingdom

Christophers, Richard A. "Machine-Readable Catalogues in the British Library." CATALOGUE & INDEX, 42 (Autumn 1976), 1,3.

Petrie, J.H. and Ede, S.J. "The Microfilming of Library Catalogues." BRITISH LENDING LIBRARY REVIEW, 2 (Apr. 1974), 53-60.

United States

"DBPH Issues New Catalog." LIBRARY OF CONGRESS INFORMATION BULLETIN, 36 (25 February 1977), 139.

STATE WIDE CATALOGS AND COLLECTIONS OF MAJOR CATALOGS FOR STATE WIDE COVERAGE

Illinois

Miele, Anthony. "The Illinois State Library Microfilm Automated Catalog (IMAC)." MICROFORM REVIEW, 2 (1972), 27-31.

"Microfilm Catalog." AMERICAN LIBRARIES. 2 (1971), 672.

New Jersey

Gillock, Oliver P. and McDonough, Roger H. "Spreading State Library Riches for Peanuts." WILSON LIBRARY BULLETIN. 45 (December 1970), 354-357.

Pennsylvania

Doms, Keith. "Union Library Catalog of Pennsylvania in Transition; It is Unique Simply Because It Has Managed to Survive..." PENNSYLVANIA LIBRARY ASSOCIATION BULLETIN. 30 (January 1975), 4-5.

South Carolina

"Book Catalogs Play Role in Interlibrary Loan." LIBRARY JOURNAL, 100 (May 1975), 802.

Texas

Cox, Carolyn M. and Juergens, Bonnie. MICROFORM CATALOGS: A VIABLE ALTERNATIVE FOR TEXAS LIBRARIES. Dallas, Texas: AMIGOS Bibliographic Council, November 1977. EDRS: ED-149-739.

West Virginia

Prossner, J. "West Virginia Union Catalog." UNABASHED LIBRARIAN, 8 (1973), 8-9.

UNIVERSITY WIDE OR INTERUNIVERSITY UNION CATALOGS

Birmingham Libraries Cooperative

Buckle, D. "Cost of a COM Catalogue System at Birmingham University Library." MICRODOC 13 (1974), 15-18.

________. "MARC-based COM Catalogues." COM APPLICATIONS IN LIBRARIES: PAPERS GIVEN AT A SEMINAR ON THE USE OF COMPUTER OUTPUT ONTO MICROFILM BY LIBRARIES, held by the Microfilm Association of Great Britain, University of Aston, Birmingham, 4th July 1973, William D. Linton, ed., Guilford: Microfilm Association of Great Britain, 1974, 26-36.

City of London Polytechnic, England

Pritchard, Alan. "City of London Polytechnic's Cataloguing System." MICRODOC, 15 (1976), 9-10+.

Kentucky

"Kentucky Department of Libraries Has Initiated a Microfilm Project with the Members of the Kentuckiana Metroversity, Inc." SOUTHEASTERN LIBRARIAN, 21 (1971), 186.

Liverpool Polytechnic Library Service

Revill, Don H. "Computer Output Microfiche Catalogues." MICRODOC, 17 (1978), 14+.

Louisiana Numerical Register

Kershner, Lois M. "User Services: 1973 Application Status." LIBRARY AUTOMATION: THE STATE OF THE ART II (Papers presented at the Preconference Institute on Library Automation held at Las Vegas, Nevada, 22-23 June, 1973. Susan K. Martin and Brett Butler, ed., Chicago, Illinois: American Library Association, 1975. 38-55.

McGrath, William and Simon, Donald. "Regional Numerical Union Catalog on Computer Output Microfiche." JOURNAL OF LIBRARY AUTOMATION. 5 (December 1972), 217-229.

"New Computer Output Microfiche Union Catalog in Louisiana." COLLEGE AND RESEARCH LIBRARIES NEWS, 6 (June 1973), 136.

"Retrospective COM Union Catalog." INFORMATION PART 1, 6 (January 1974), 10-11.

University of Missouri

Carroll, Edward C. "A More Efficient Way to Share Library Resources." MICROFORM REVIEW, 1 (October 1972), 274-278.

University of Texas

Meyer, R.W. and Knapp, J.F. "COM Catalog Based on OCLC Records." JOURNAL OF LIBRARY AUTOMATION, 8 (December 1975), 312.

__________ and Juergens, Bonnie. "Computer Output Microfiche Catalogs: Some Practical Considerations." JOURNAL OF MICROGRAPHICS, 11 (November-December 1977), 91-96.

COLLEGE, UNIVERSITY, OR RESEARCH LIBRARY CATALOGS

Cantonal and University Library

Gavin, Pierre. "Automation of Cataloguing: Some Effects on Library Organization." UNESCO BULLETIN FOR LIBRARIES, 31 (September-October 1977), 298-304.

Claremont College

Teare, Robert. Talk given at a conference sponsored by the Special Libraries Association of Southern California and the Micrographics Association of Southern California, November, 1975.

El Centro College, Texas

"Microfilm Claimed Tops for Library Catalog." LIBRARY JOURNAL, 94 (May 1969), 1936.

Sparkman, Mickey M. (Letter in reply to R.C. Sullivan). COLLEGE AND RESEARCH LIBRARIES, 34 (May 1973), 225.

Georgia Tech

"Georgia Tech Cites Saving From Fiche Catalog." ADVANCED TECHNOLOGY/LIBRARY, 5 (January 1976), 2.

Greene, Robert John. FACULTY ACCEPTANCE AND USE OF A SYSTEM PROVIDING REMOTE BIBLIOGRAPHIC AND PHYSICAL ACCESS TO AN ACADEMIC LIBRARY BOOK COLLECTION. Thesis (Ph.D) Florida State University, 1973.

__________________. "Lends: An Approach to the Centralization/Decentralization Dilemma," COLLEGE AND RESEARCH LIBRARIES. 36 (May 1975), 202-207.

__________________. "Microform Attitude and Frequency of Microform Use." JOURNAL OF MICROGRAPHICS, 8 (January 1975), 131-134.

__________________. "Microform Library Catalogs and the LENDS Microfiche Catalog." MICROFORM REVIEW, 4 (January 1975), 30-34.

Roberts, Edward Graham and Kennedy, John P. "The Georgia Tech Library's Microfiche Catalog." THE JOURNAL OF MICROGRAPHICS, 6 (July 1973), 245-251.

Harvard University

"Houghton Library of Harvard University." COLLEGE AND RESEARCH LIBRARIES, 7 (July 1978), 195-196.

Leeds University, England

Butler, R. and Case, R. "Book Circulation at Leeds University Student Library: An Off-Line System Incorporating Bibliographic Information." PROGRAM, 12 (January 1978), 16-25.

Mankato State College

Gabriel, Michael. (Letter in reply to W. Saffody). JOURNAL OF LIBRARY AUTOMATION, 8 (March 1975), 79-80.

Milperra College of Advanced Education, Australia

Gatenby, J. "MARC Based Microfiche Catalogue at the Milperra College of Advanced Education." LASIE (LIBRARY AUTOMATED SYSTEMS INFORMATION EXCHANGE), 7 (May/June 1977), 18-28.

New South Wales Institute of Technology, Australia

Peake, D.G.; Poole, M. and Wilschefski. "Use of Microform at the New South Wales Institute of Technology." LASIE (LIBRARY AUTOMATED SYSTEMS INFORMATION EXCHANGE), 6 (May/June 1976), 26-37.

New York Public Library, Research Libraries

New York Public Library. THE USE OF MICROFILM IN RELATION TO THE RETROSPECTIVE AND PROSPECTIVE CATALOGS OF THE RESEARCH LIBRARIES OF THE NEW YORK PUBLIC LIBRARY. A report to the Council on Library Resources (CLR Grant No. 516). June 1972. EDRS: ED-067 107

Ohio State University

Clark, Alice S. "Subject Access to a Data Base of Library Holdings." JOURNAL OF LIBRARY AUTOMATION, 7 (December 1974), 267-274.

Oslo University, Norway

Strom, Ola. "Mikroformer: Folkebibiotekene (Microforms in Public Libraries)." BOK OG BIBLIOTEK, 43 (1976), 300-303.

Purdue University Libraries

Corya, William L. and Lelvis, Gary C. "The Integration of Formats to Provide Catalog Access Services." 4th ASIS (AMERICAN SOCIETY FOR INFORMATION SCIENCE) MID-YEAR MEETING PROCEEDINGS, held at Portland, Oregon, 15-17 May 1975. Frances G. Spiga, Theodore C.W. Grams, Julie Kawabata, ed., Washington, D.C.: ASIS, 1975. 96-104.

Rand Afrikaans University

Aschenborn, Hans J. "The Use of Microfilm in South African Libraries." JOURNAL OF MICROGRAPHICS, 6 (October 1972), 33-37.

Royal Melbourne Institute of Technology, Australia

Eichinski, G. "Microfilm and Microfiche Catalogue Comparison at Royal Melbourne Institute of Technology Central Library." LASIE (LIBRARY AUTOMATED SYSTEMS INFORMATION EXCHANGE, 8 (March - June 1978), 20-28.

Strecher, Elizabeth. "RMIT Catalogue Study Results." AUSTRALIAN LIBRARY JOURNAL, 24 (1975), 384-389.

Ryerson Polytechnical Institute; Toronto, Canada

North, John. "Card Catalog to COM." LIBRARY JOURNAL, 102 (15 October 1977), 2132-2134.

Southampton University Library, England

"Southampton University Library Changes Over from COM Film to COM Fiche Catalogues." PROGRAM, 11 (July 1977), 115-116.

Swinburne College of Technology, Australia

Villwock, K.M. "Computer Produced Catalogues: Book or COM and, Emma Chisit?" LASIE (LIBRARY AUTOMATED SYSTEMS INFORMATION EXCHANGE), 6 (May 1976), 2-22.

University of Augsburg, West Germany

Frankenberger, Rudolf. "Mikrofichekataloge an der Universitat Augsburg (Microfiche Catalogues at the University of Augsburg)." BIBLIOTHEKS-FORUM BAYERN, 4 (1976), 126-140.

University of Aston, England

Hadlow, James F. "Some Problems with COM Catalogues." MICRODOC, 16 (1977), 75-76+.

Reid, B.J. "Use of Microforms in the Library of the University of Aston in Birmingham." MICRODOC, 15(1976), 89-90+.

University of California, Berkeley

Martin, Susan K. "Mixed Media for a Serial System: Hardcopy, Microform, and CRT's." 4th ASIS (AMERICAN SOCIETY FOR INFORMATION SCIENCE) MID-YEAR MEETING PROCEEDINGS, held at Portland, Oregon, 15-17 May, 1975. Frances G. Spiga, Theodore C.W. Grams, Julie Kawabata, ed., Washington, D.C.: ASIS, 1975. 111-118.

University of Guelph; Ontario, Canada

Gillham, Virginia and Black, John B. ADMINISTRATIVE AND BIBLIOGRAPHIC USES OF COM (COMPUTER OUTPUT MICROFILM) IN AN ACADEMIC LIBRARY: PAPER PRESENTED AT THE 7th ONTARIO UNIVERSITIES COMPUTER CONFERENCE, held at Waterloo, Ontario, Canada, 2-4 June, 1976. Guelph, Ontario: University of Guelph, McLaughlin Library, June 1976. EDRS: ED-127-914.

University of Toronto, Canada

Altman, Ellen. "On My Mind...Reactions to a COM Catalog." JOURNAL OF ACADEMIC LIBRARIANSHIP, 3 (November 1977), 267-268.

De Bruin, Valentina. "Sometimes Dirty Things Are Seen on the Screen: A Mini-Evaluation of the COM Microcatalogue at the University of Toronto Library." JOURNAL OF ACADEMIC LIBRARIANSHIP, 3 (November 1977), 256-266.

"University of Toronto Closes Public Card Catalog and Initiates COM Catalog." JOURNAL OF LIBRARY AUTOMATION, 10 (March 1977), 85.

University of Wisconsin

Schwarz, P.J. "Computer Output Microfilm; Stout Uses a New Library Tool." WISCONSIN LIBRARY BULLETIN, 72 (May 1976), 125-126+.

Wayne State

Saffody, William. "A Computer Output Microfilm Serials List for Patron Use." JOURNAL OF LIBRARY AUTOMATION, 7 (December 1974), 263-266.

Western Kentucky University

Wassom, Earl E. and Jones, Richard A. "Bibliographic Access to Full Descriptive Cataloging with COM." JOURNAL OF LIBRARY AUTOMATION, 11 (March 1978), 47-53.

Yale

Lipetz, B. (Letter in reply to R.C. Sullivan). COLLEGE AND RESEARCH LIBRARIES, 34 (May 1973), 224-225.

Ungerleider, S. Lester. "A Study of COM Usability in the Technical Processing Area of Yale University Library." JOURNAL OF MICROGRAPHICS, 7 (November 1973), 81-89.

OTHER UNION CATALOG SYSTEMS

Anoka County Library, Minnesota

Felinist PR (Publicizing the Computer Output Microform Catalog). AMERICAN LIBRARIES, 9 (October 1978), 519.

Baltimore County

"Microfilmed Catalog Slated for Baltimore County." LIBRARY JOURNAL, 100 (May 1975), 802.

Brighton, England

Hassell, R. "MARC Well." NEW LIBRARY WORLD, 74 (May 1973), 97-98.

Cheshire County, England

Brown, F.W. "Cheshire's Book Ordering and Cataloguing System." COM APPLICATIONS IN LIBRARIES: PAPERS GIVEN AT A SEMINAR ON THE USE OF COMPUTER OUTPUT ONTO MICROFILM BY LIBRARIES, held by the Microfilm Association of Great Britain University of Aston, Birmingham, 4th July 1973, William D. Linton, ed. Guilford: Microfilm Association of Great Britain, 1974. 6-14.

Columbus and Franklin County Public Library, Ohio

"COM Database at Columbus for Rent." LIBRARY JOURNAL, 103 (15 November 1978), 2290.

Cornwall County, England

Burlton, Vyvyan. "Cornwall's Automated Cataloguing System." CATALOGUE AND INDEX, 32 (Winter 1973), 4-5.

Eindhoven Technische Hoge School (Technical High School in Eindhoven), Netherlands

Prinxter, P.J. C.A. "Catalogi op Microfiches in een Middelgrote Bibliotheek (I) (Catalogs on Microfiche in a Medium-Sized Library (I))." OPEN, 9 (October 1977), 473-480.

________________. "Catalogi op Microfiches in een Middelgrote Bibliotheek (II) (Catalogs on Microfiche in a Medium-Sized Library (II))." OPEN, 9 (November 1977), 533-540.

Fairfax County Public Libraries, Virginia

"COMCAT, the Revolutionary Computer Output Microfilm Catalog." SOUTHEASTERN LIBRARIAN, 26 (Summer 1976), 110.

"Virginia. COMCAT is Coming!" SOUTHEASTERN LIBRARIAN, 26 (Spring 1976), 42-43.

Greenville County Library, South Carolina

"S.C. Microfilm Catalog Made Possible by CETA." LIBRARY JOURNAL, 102 (15 October 1977), 2112.

Harford County Library, Maryland

"First Card-to-Micro Catalog Claimed by Harford Co., Md." LIBRARY JOURNAL, 101 (15 May 1976), 1164.

Hidalgo County Library System, Texas

"COM Catalog Containing the Major Collection of Mexican-American Materials Owned by the Hidalgo County Library System." TEXAS LIBRARY JOURNAL, 54 (Spring 1978), 70.

London Area and Southeast Region

Bevan, Alan. "The Laser Retrospective Catalogue Conversion Project." CATALOGUE AND INDEX, 35 (Winter 1974), 1, 4-5.

Los Angeles Public Library

Fischer, Mary L. "The Use of COM at the Los Angeles Public Library." THE JOURNAL OF MICROGRAPHICS, 6 (May 1973), 205-210.

"L.A. Public Library Moves to COM." JOURNAL OF LIBRARY AUTOMATION, 10 (December 1977), 377.

Michigan Public Libraries

"Michigan Public Libraries Converting to COM; Lower Costs a Major Factor." ADVANCED TECHNOLOGY/LIBRARIES, 5 (January 1976), 1-2.

Ramapo-Catskill Library System, New York

Gaines, Katherine. "Undertaking a Subject Catalog in Microfiche." LIBRARY RESOURCES AND TECHNICAL SERVICES, 15 (Summer 1971), 297-308.

St. Louis County

Rogers, Jo Ann. "From Cards to COM in St. Louis County." UNABASHED LIBRARIAN, 25 (1977), 27-29.

Shropshire County, England

Crowe, A.J. "Computer Cataloguing at Shropshire County Libraries." COM APPLICATIONS IN LIBRARIES: PAPERS GIVEN AT A SEMINAR ON THE USE OF COMPUTER OUTPUT ONTO MICROFILM BY LIBRARIES, held by the Microfilm Association of Great Britain, University , University of Aston, Birmingham, 4th July 1973, William D. Linton, ed. Guilford: Microfilm Association of Great Britain, 1974. 21-25.

Virginia Beach Department of Public Libraries

Virginia Beach Department of Data Processing. COST/BENEFIT ANALYSIS OF A CATALOG SYSTEM FOR THE VIRGINIA BEACH DEPARTMENT OF PUBLIC LIBRARIES. Virginia: Virginia Beach Department of Data Processing, 1978. EDRS: ED-153-657.

Westminster City Libraries, England

Larkworthy, Graham and Brown, Cyril. "Library Catalogs on Microfilm." LIBRARY ASSOCIATION RECORD, 73 (December 1971), 231-232.

Le Croisette, Jill C. "Microfilm Catalogs in a British Public Library System." MICROFORM REVIEW, 4 (April 1975), 104-107.

Winnepeg Public Library, Canada

"Microfilm Retrieval System to Access Central Library Holdings from Branch Libraries." INFORMATION: PART 1, 6 (July 1974), 168.

SPECIAL LIBRARY CATALOGS

ALIRT (Analytic Library Information Retrieval and Transfer)

Boyes, K.A. and Tawaij, M.M. "A COM Catalogue in an Informal Special Library Network." 41st ASIS (AMERICAN SOCIETY FOR INFORMATION SCIENCE) MEETING PROCEEDINGS, held at New York, 13-17 November 1978. Everett H. Brenner, compiler, White Plains, New York: Knowledge Industry Publications, Inc., 1978. 48-50.

Cornell-Museum Pusat

Oiok , P. "Cornell-Museum Pusat Microfilm Project." MICROFORM REVIEW, 2(July 1973), 165-166.

Dutch Broadcasting Foundation Music Library

Van Werkhoven, H.B.M. "The Automation Plans of the Music Library of the Netherlandse Omroep Stichting (Dutch Broadcasting Foundation)." FONTES ARTIS MUSICAE, 24 (April-June 1977), 72-74.

Eastman Kodak Libraries

Freund, Clare E. "Catalog on Microfiche at the Eastman Kodak Libraries." SPECIAL LIBRARIES, 68 (November 1977), 375-382.

Hughes Company

Folk, Clara A.; Campbell, B.W. and Bloomfield, Masse. "A Microfilm Catalog at Work." SPECIAL LIBRARIES, 67 (July 1976), 316-318.

Matsumiya, H. and Bloomfield, M. "Working Microfilm Catalog." SPECIAL LIBRARIES, 55 (March 1964), 157-159.

Lockheed

Kazumplik, William and Lange, R.T. "Computer Produced Microfilm Library Catalog." AMERICAN DOCUMENTATION, 18 (April 1967), 67-80.

National Portrait Gallery

"Computer-Output-Microfiche in the Catalog of American Portraits." MICROFORM REVIEW, 24 (October 1973), 254.

United Aircraft Labs

Neufeld, I.H. "Computer Applications in the United Aircraft Corporation Library System." SPECIAL LIBRARIES, 64 (May, 1973), 235-238.

IV ANALYSIS

The following lists data about each of the operational (and, in some cases, planned) uses of microforms in library cataloging related functions. For each context, the following data are listed (where they were available):

1. System
2. Catalog
3. Record
4. Output
5. Update
6. Production
7. Equipment
8. Costs
9. Comments

The entries are grouped by major category of context:

- National Contexts
- State-wide Contexts
- University-wide and Inter-university Union Contexts
- Individual Academic Institutional Contexts
- Other Union System Contexts
- Special Library Contexts

NATIONAL

SYSTEM: Belgian Union Catalog of Periodicals

CATALOG: Supplement to the 1965 Union Catalog of Foreign Periodicals, consists of 28,000 perioidcals from more than 300 libraries.

RECORD: TI, place and date of edition, references to previous TI, bibliographic evolution, references from parallel TI, references to translation, references from variant forms of TI, library holding, etc.

OUTPUT: Fiche: 42X R. On 9 fiche.

PRODUCTION: Inputs are on punched cards entered into the Siemens 4004/135 system in batch mode. Microfiche are printed by Ordina Benelux with a DatagraphiX 4500, model 130 COM system.

COSTS: Original fiche: $ 4.00 each.
Fiche copy: $ 0.25 each.

SYSTEM: British Library

CATALOG: British National Bibliography entries (since 1971). Cataloging of other material in English by the Refernce Diviision, and work of other European scripts.

OUTPUT: Film: 16mm, in cassete. 21457 records on 2 reels of AU/TI catalog, 2 reels of PRECIS SU catalog, and 1 reel of index. (COM)

UPDATE: Bimonthly.

PRODUCTION: Records are keyboarded outside, and when the conversions to magnetic tapes are returned to the Library, a dianostic is produced for proof reading by Reference Division.

COMMENT: It is hoped that not more than 3 to 5 years output will be on microfilm at any one time, and when the file reaches a given size, a computer photo-set book catalog will be available, cumulated every few years and with microfilm supplement.

SYSTEM: BRITISH LIBRARY - Bibliographic Division COM Catalogue Service (subscribed by City of London Polytechnic and City University Library)

OUTPUT: COM fiche.

SYSTEM: BRITISH LIBRARY - Lending Division

CATALOG: Catalogs of 46 individual libraries.

OUTPUT: Film: 24X R, code line and flashe card indexing.

PRODUCTION: Rotary and planetary on and off site.

COMMENT: Argue that fiche unsuitable for large files or public access. Faster retrieval of fiche not as significant for British Library Lending Division which searches sorted batches. Uses 24X R because of greater legibility.

SYSTEM: LIBRARY OF CONGRESS - Division for the Blind and Physically Handicapped (DBPH)

CATALOG: Union catalog of braille and recorded materials - Reading Material for the Blind and Physically Handicapped. 10,000 titles. The catalog has 6 sections: ME (Full Bibliographic Record), SU, DBPH book #, narrator, Dewey decimal classification #, and foreign language.

OUTPUT: COM fiche: 4" x 6".

SYSTEM: NATIONAL LIBRARY OF AUSTRALIA

CATALOG: National Union Catalog of Monographs.

RECORD: Monographs only.

OUTPUT: Film. Indexed.

UPDATE: Maintain card file for filming adds. Annual.

EQUIPMENT: Output will be suitable for range of equipment.

COMMENT: Future updates likely to be COM from Australian MARC.

SYSTEM: NATIONAL LIBRARY OF SCOTLAND
OUTPUT: Film; in cassette. 130 cassettes.
EQUIPMENT: Scottish Instruments Planet film reader.

SYSTEM: RHODESIAN LIBRARIES
CATALOG: Periodical holdings of Rhodesian Libraries.
OUTPUT: COM fiche.
UPDATE: Frequent updates intended.

SYSTEM: SCOTTISH UNION CATALOG (mix. of univ., res., & public)
CATALOG: 9000 added vols/month. Have .5 million unfiled entries.
RECORD: ISBN & location only.
OUTPUT: COM film.
UPDATE: Bimonthly.
COSTS: Borneby British Library and participating libraries.
COMMENT: Should improve ILL efficiency.

SYSTEM: SOUTH AFRICAN UNION CATALOG (151 participating libraries)
CATALOG: Begun 1942, closed 1972 with 2.5 M entries. Since 1972, all entries on fiche 2600 adds/month.
RECORD: ISBN & location only.
OUTPUT: Fiche: 42X. 1100 titles/che.
UPDATE: Quarterly. If fiche get too awkward, will film base and start fiche again.

SYSTEM: UNITED STATES DEPARTMENT OF CONSUMER AFFAIRS

OUTPUT: COM film.

EQUIPMENT: Information Design ROM 3 reader.

STATE

SYSTEM: HAWAII - Entire public and academic library system.

OUTPUT: COM.

SYSTEM: ILLINOIS STATE LIBRARY

CATALOG: 600,000 vols. 280,000 titles. 1 M cards.

OUTPUT: Film: 16mm, in cartridge. 30 sets of catalog. 18,000 cards/cartridge. 57 cartridges for retro. catalog. 7 cartridges for current catalog. Odometer indexing. Location of item in 30 secs. max. 6 secs. to get hard copy at 5¢.

[illegible]TE: Quarterly. Cumulative for all supps.

PRODUCATION: 50,000 cards processed/day(2.5 reels). Dup., inspec., loading in cartridge for 30 sets took 54 worker days.

EQUIPMENT: Film 2.5 ml thick. Cartridge holds 215 feet. Motor driven readers.

COSTS: Reader printers: $1,900
Cart. carousel: $100
30 sets of cat.: $633
(lab: 10,075. mat.: 760. tran: 155)

COMMENT: Goal was expedite ILL. Claims reduction in ILL costs. Bene's cited immediate access to state collection, ref. tool, catalog data tool.

SYSTEM: KANSAS STATE LIBRARY

CATALOG: Union List (it will include the holding of the State Library and its affiliate library systems).

OUTPUT: COM film.

PRODUCTION: Library Interface Systems, Inc. (Minnetonka, MN) is handling the conversion.

EQUIPMENT: Information Design ROM 3 terminals.

SYSTEM: MARYLAND STATE LIBRARY - MICROCAT

CATALOG: Holding list for the major libraries in the state, including Enoch Pratt, Prince George's County, Baltimore County, Montgomery County, Anne Arundel County, the Univ. of Maryland, Towson State Univ., and Essex Community College. 800,000 titles.

OUTPUT: COM.

PRODUCTION: Auto-Graphics (Montery Park, CA) provided film for MICROCAT and hardwares to all Maryland public libraries, participating academic libraries, and other academic libraries in the Interlibrary network of Baltimore County.

EQUIPMENT: Auto-Graphics LCR 1100 readers.

SYSTEM: NEW JERSEY STATE LIBRARY

CATALOG: 600,000 A/T/S cards. 200,000 titles.

OUTPUT: Film.

UPDATE: Quarterly by filming separate card file.

COSTS: Masters: $ 1,000
Dupes: $5,103
CARTR: $ 1,795

COMMENT: Speeds ILL. Claims cuts labor for ILL.

SYSTEM: New York State Library

RECORD: Brief entry.

OUTPUT: COM film: roll.

SYSTEM: SOUTH CAROLINA STATE LIBRARY (and 32 county and reg. libraries)

OUTPUT: Film.

COSTS: LSCA funded.

SYSTEM: UNION LIBRARY CATALOG OF PENNSYLVANIA

CATALOG: 10 M+ cards.

OUTPUT: Film.

COMMENT: Will provide M/film copies to decentralized locations to ease burden of ILL on ULC.

SYSTEM: WEST VIRGINIA STATE LIBRARY

CATALOG: Union Catalog of 1 M cards of 50 state institutions (5 M vols.).

OUTPUT: COM fiche.

PRODUCTION: The state updates the catalog through Auto-Graphics, Inc. (Montery Park, CA) on fiche through the Auto-Graphics MARC Cataloging Service.

UNIVERSITY WIDE & INTERUNIVERSITY UNION

SYSTEM: BIRMINGHAM LIBRARIES COOPERATIVE MECHANISATION PROJECT

CATALOG: Machine readable since 1972. Name catalog - 70,000 entries.

OUTPUT: Union and local catalogs on tape. Birmingham has COM output, microfilm.

UPDATE: Monthly.

SYSTEM: CITY OF LONDON POLYTECHNIC

CATALOG: Union catalogs: alphabetic, and classified catalogs.

OUTPUT: COM fiche: 48X R, 208 frames/fiche, 2 columns/frame. Currently: 13 alphabetic fiche, 7 classified fiche.

UPDATE: Monthly cumulation.

PRODUCTION: Uses the British Library full cataloging service. Input forms are sent to British Library. Then British Library sent formatted tapes to NCR. NCR pass the tapes through their Quantor 105 COM fiche machine to produce COM catalog.

EQUIPMENT: NCR 200 COM fiche readers.

COSTS: For 10,000 vols:
Input: £ 750
Processing (British Library): £ 3,000
Output (NCR): £ 400 per year

10 readers at £ 125 each

SYSTEM: EL CENTRO COMMUNITY COLLEGE, Texas

CATALOG: 35,000 books. 1,500 phonodisks.

RECORD: AU/TI/Call #.

OUTPUT: 21 Fiche total: 7 AU, 6 TI, 8 SU.

UPDATE: Bimonthly.

SYSTEM: LIVERPOOL POLYTECHNIC LIBRARY SERVICE

OUTPUT: COM fiche: 42X R, 208 frames/fiche (roughly 300 entries/fiche).
Catalog in alphabetical (43 fiche) sequences, classified (14 fiche) file, and subject (8 fiche) index.

PRODUCTION: Polytechnic Computer Unit first inputted the data. Later, an MDS 1101 magnetic tape was acquired and the Central Service Unit of Liverpool Polytechnic Library Service did the inputting. Then, the Eurocom Bureau in Manchester produced the COM fiche catalog.

COSTS: The Eurocom Bureau COM Service: £ 850/yr.

REACTION: Good quality fiche.

SYSTEM: LOUISIANA NUMBERICAL REGISTER

CATALOG: Union catalog in Louisiana containing locations for 1.1 M vols in 21 Louisiana libraries.

RECORD: LC card # and holding code.

OUTPUT: COM fiche: 42X R, 600 entries/page. Requires 5 fiche Approx. 120,000 entries/fiche.

UPDATE: Annual.

COSTS: 5.6 cents/entry.
2.8 cents/title.
Update costs $ 3 - 4 /copy.

COMMENT: Used for overlap studies. Intend to use other numeric ID's (e.g. ISBN). Could match numeric ID with machine readable data base to produce full record catalog. Particularly useful as a location tool for Interlibrary loans.

SYSTEM: KENTUCKIAN METROVERSITY

CATALOG: 4 M+ cards.

COSTS: Funded via LSCA Title III.

COMMENT: Film stored at Louisville Information Referral Center. Goal is better, faster ILL. If successful will expand operations to other major library collections in Kty. to be held by the Dept. of Libraries which will serve as bib. control center.

SYSTEM: UNIVERSITY OF MISSOURI

CATALOG: 4 M cards.

OUTPUT: 16 mm, in cartridge. Location & printout takes 90 secs.

UPDATE: 3 campuses maintain separate card files & film periodically
1 campus uses COM (excludes non-roman type).

EQUIPMENT: Film 2.5 ml thick. Cartridge holds 215 feet.
Motor driven readers.

COSTS: $ 25,000 estimated total.

COMMENT: Goal was more efficient bib. access to campus holdings.

SYSTEM: UNIVERSITY OF TEXAS

CATALOG: 270,000 titles (as of Jan 1975).
At Dallas campus, the annual growing rate is 20,000 titles.

RECORD: In AU catalog (brief entries): AU, TI, date of publication, and call #.
TI catalog (full entries): FBR.
SU catalog (truncated entries): AU, TI, edition, date of publication, SU tracing, and call #. With cross references.
Shelflist: FBR arranged by call # with MARC tags shown.

OUTPUT: COM fiche: 3 columns.
COM film.

UPDATE: Annual cumulation. Biweekly cumulation (on fiche).

PRODUCTION: Catalog through Amigos. Input is done via CRT terminal to OCLS using the MARC II format. When OCLC tape arrives, the records are processed (for checking and conversion to an ERCDIC character set) on a local computer and then sent to Blackwell North America (B/NA). When records are received by B/NA in Portland, they are added to the data base, and produce the COM catalog.

COSTS: Comparative:

Book catalog	$ 5,000
COM catalog with readers (45 copies)	$ 5,000

REACTION: Complained that the catalog was "hard on the eyes" and that the machines were difficult to use.

COLLEGE, UNIVERSITY, RESEARCH LIBRARY

SYSTEM: CANTONAL AND UNIVERSITY LIBRARY; Lausanne, Switzerland

CATALOG: 90,000 entries. 28,000 entries added yearly. Special collection catalogs.

OUTPUT: COM microcards.

COMMENT: Intend to close down the card catalog with effect from 1977 and to replace it by a computer catalog or COM microcards catalog.

SYSTEM: CITY UNIVERSITY LIBRARY

OUTPUT: COM fiche.

PRODUCTION: Subscribe to the British Library Bibliographic Division COM catalogue Service.

SYSTEM: CLAREMONT

CATALOG: Science Library Collection.

OUTPUT: 52 fiche.

PRODUCTION: COM from OCLC archivetape.

SYSTEM: FEDERAL CITY COLLEGE, Washington, D.C.

OUTPUT: COM.

SYSTEM: FLORIDA TECHNICAL UNIVERSITY

CATALOG: 120,000 titles (as of Jan 1975).

OUTPUT: COM fiche.

SYSTEM: GEORGIA INSTITUTE OF TECHNOLOGY

CATALOG: 750,000 titles (as of Jan 1975).
The remaining collection (125,000 titles) is also available in a microform catalog that was produced by filming the card catalog. These titles are gradually being added to the data base and included in the COM catalog. When this is completed (in 2 or 3 years), the card catalog will be discarded.
600,000 microtexts. Heavy concentration of serials.
Machine readable since 1966. Base catalog through 1972. Supplement since 1972.

RECORD: MARC format since 1966.

OUTPUT: COM fiche; 42X R.
Fiche.
Base cat.: 717 fiche, 42X R, 1000 entries/fiche.
AU/TI/SU & serials (color coded).
Supplement: 6000 monos. or 12,000 serials/fiche, 42X R. Arrangement is column of entries that extends length of fiche.

UPDATE: Bimonthly supplement.

PRODUCTION: Base catalog produced by rotary camera allowing high density and file integrity, and minimum disruption of service. 6-7,000 cards/day filmed by crew of 3 non-tech. people superv. by cataloger. 16 mm film shot at half width slit into 5 mm strips, mounted on 4 x 6 acetate. COM catalog is produced by a service bureau.

EQUIPMENT: Viewer: REALIST VANGUARD 3333 (50X), has 2 fiche bins, sturdy, easy to use, image slightly larger than original. Chose fiche over film because easier to use, more reliable readers. No problems to date with misfiling of fiche.

COSTS: Base catalog: less than 1¢ per card not counting time of library staff superv.
Supplemtnt: Original + 50 copies of 11 fiche: $260.
Comparative (on annual update):
COM: $ 3,500 - 4,000 /yr.
Card: $ 8,000 /yr.

REACTION: Introl by letters, brochures, demos. Instructions mounted between bins. Interviews with faculty led to conclusion "...that use of microform catalogs by libraries may not encounter the user resistance that has been experienced in use of other microforms in libraries.

COMMENT: "Faculty seems weel pleased and compliments are frequent."
"Real savings in man hours in technical processing."

SYSTEM: HARVARD UNIVERSITY, Houghton Library
CATALOG: Accession Records of every item acquired since 1942.
RECORD: Date of acquisition, source, fund used for purchase, and price.
OUTPUT: Film.
COSTS: Grant from National Endowment for the Humanities: $13,803.

SYSTEM: HATFIELD POLYTECHNIC LIBRARY
OUTPUT: Film: 16 mm, roll, negative polarity.

SYSTEM: LEEDS UNIVERSITY, Student Library
CATALOG: 27,000 titles.
OUTPUT: COM film: 16 mm.
UPDATE: Quarterly
PRODUCTION: The data base is held on disc, and output is on COM.
COMMENT: Unlike many systems, the circulation data base is also used for the public catalog - an Integrated Cataloguing/Circulation System.

SYSTEM: LINCOLN UNIVERSITY, Pennsylvania
CATALOG: Afro-American collection.
PRODUCTION: Science Press will handle the conversion to COM.
EQUIPMENT: Information Design will provide the ROM 3 readers.

SYSTEM: MANKATO STATE COLLEGE
CATALOG: Serials holding list.
OUTPUT: COM fiche: 42X R. 4 fiche.
REACTION: Patrons have no trouble with four fiche file.

SYSTEM: MICHIGAN UNIVERSITY LIBRARY
CATALOG: In-Process-File.
OUTPUT: COM.

SYSTEM: MILPERRA COLLEGE OF ADVANCED EDUCATION, Australia
CATALOG: 150,000 vols.
OUTPUT: COM fiche. Catalog in 2 sequences: AU/TI, and Su.
PRODUCTION: The Libramatic System Pty, Ltd. generated the MARC based catalog master on tape. And the tape is sent to a COM bureau (currently MIS in Sydny) for COM production.
REACTION: Students were fairly quick to accept and use the new catalog. Academic staff seemed happy to receive departmental copies (provided they purchase their own reader).

SYSTEM: NEW SOUTH WALES INSTITUTE OF TECHNOLOGY

CATALOG: Catalog in the Processing Section use the BIBNET 120 System - contains: NUC (1963 to date), LC cataloging (1970 to date), CIP data (1972 to date) and shared cataloging from North America academic libraries from 1964.

Also back issues of NUC on microfiche were purchased.

COM catalog size	# of records
AU/TI (1975 cum):	87,605
AU/TI (April 1976 supple.):	12,293
SU (1975 cum.):	54,142
SU (April 1976 supple.):	6,866

OUTPUT: Fiche catalog in the Processing Section.

COM fiche: 48X R, 270 frames/fiche. AU/TI, and SU catalogs.

EQUIPMENT: For Processing Section:

Microfiche reader/printer 3M 500M fitted with a half-sheet kit which gives a small sheet when a print is taken. 29X lens is used with BIBNET fiche and 35X lens with NUC fiche.

For COM catalog:

Stromberg DatagraphiX (distributed by Computer Resources Group) - has a vertical screen.

Canorama 400S (distributed by Rank Industries) - has an angled screen.

COSTS:

	First year (1976)	Recurring (1977)
COM Cumulation:	$ 475	$ 630 (approx.)
COM Supplement:	727 (approx.)	727 (approx.)
Units for Fiche:	520	
	$7,232	$1,357

Cost for COM: $5.20 per master. $0.15 per copy.

REACTION: Remarks made by users indicate a positive reaction on the COM microfiche catalogue.

SYSTEM: NORTHERN VIRGINIA COMMUNITY COLLEGE LIBRARIES

OUTPUT: COM.

SYSTEM: OSLO UNIVERSITY LIBRARY, Norway

CATALOG: Union catalog of foreign periodicals in Norwegian libraries.

OUTPUT: Microform.

SYSTEM: PRUDUE UNIVERSITY LIBRARIES

CATALOG: Serials catalog data listing.
Subject listing of the library complete catalog system (plan) serve as a finding tool to the complete bibliographic information stored on line.

OUTPUT: COM fiche: 42X R. 11 fiche plus 1 or 2 supplement fiche.

PRODUCTION: Produced by a service bureau in Indianapolis from a magnetic tape created on ADPC's 370/145 computer.

EQUIPMENT: Kodak Easamatic COM readers.

COSTS: Compartive (of 32 copies of the 2088 pages Serials catalog):
COM fiche: $ 98.30
Paper: $ 920.97

COMMENT: Advantage of microfiche over hard copy is lower cost. The function of microfiche used as a "look up" or finding tool and the function of fiche as a source document must be made clear to the user because reading fiche source document for long period does become tiring whereas microfiche used only for a quick look up does not have this problem.

SYSTEM: RAND AFRIKAANS UNIVERSITY, South Africa

CATALOG: Machine readable 140,000 vols.

OUTPUT: Fiche. 13 fiche replace 3,000 pages.

COMMENT: "...Students and lecturers are making full use of the new form and no user resistance whatsoever has been encountered."

SYSTEM: REGENSBURG AND AUSBURG UNIVERSITY LIBRARIES, West Germany

OUTPUT: COM fiche.

COMMENT: Reduction in cataloging costs.

SYSTEM: ROYAL MELBOURNE INSTITUTE OF TECHNOLOGY, Australia

CATALOG: In 1975, catalog supplements.
In 1976, full catalog.

OUTPUT: Film catalog supplements.
Fiche: 42X R. 37 fiche for AU/TI sequence, 25 fiche for SU sequence.
COM film catalog fitted on 14 cassettes: 8 for AU/TI sequence, 6 for SU sequence.

EQUIPMENT: GAF DMR 7800 microfiche viewers.
Canon Canorama with new horizon image surface.
Dataview (marketed by Computer Resources) - impressed the staff.

COSTS: Comparative:

	Printed book w/ computer printout sup.	Printed book w/ COM film sup.	Complet cat. on COM film
1976	$ 15,488	$ 20,492	$ 12,792
1977	17,886	1,688	7,705
1978	20,070	20,314	8,617
	$ 53,070	$ 42,494	$ 29,114

$ 5,500 for production of 600 fiche masters, and 22,000 fiche copies over the year.
COM film: Original: $ 27 per 1,000 frames.
Negative copies: $ 4.51 per 100 ft.
COM viewers: $ 600 each. Miantenee costs $ 50/yr.

REACTION: Catalog users prefer fiche over film.

COMMENT: COM is a cost-effective alternative to full print catalog.

SYSTEM: RYERSON POLYTECHNICAL INSTITUTE; Toronto, Canada

CATALOG: 160,000 items.

RECORD: Abridged information: ME, TI, date, location, and call #.

OUTPUT: COM fiche: 42X R, 208 frames/fiche, 2 columns/frame.
The catalog is in 3 sequences: SU, AU, and TI.
The SU catalog is on 36 fiche.

PRODUCTION: The machine-readable records were already available, stored at the University of Toronto Library Automation Systems (UTLAS), as the product from a cooperation project called College Bibliocentre. Thus, these records were used to produce the COM.

REACTION: The abridged entries did not caused users as many problems as thought.

COMMENT: "The education of the users were generally much easier than expected." "We no longer have internal control of our catalog. We are at the mercy of the computer people who can change schedule or increase prices..."

SYSTEM: SOUTHAMPTON UNIVERSITY LIBRARY

CATALOG: MICROCAT (short title catalog).
Periodical catalog, and its SU index.
Wessex Medical Library catalog.

RECORD: Short title catalog.

OUTPUT: COM film: roll, in cassette. Then, changed in 1966 to COM fiche.

EQUIPMENT: Planet viewers (manufactured by Scottish Instuments Ltd.).
Regma LCOM 2 microfiche viewers.

REACTION: Most people find fiche viewer easer than film viewer to use. Majority favored the fiche version of the catalog.

COMMENT: Changed to fiche from film for 2 reasons: 1) readers for fiche have better quality, 2) as collection grows, problems of housing the growing number of film cassette.
Side effect of the change: Department in Southampton University have requested copies of the catalog and have purchased viewers.

SYSTEM: SWINBURNE COLLEGE OF TECHNOLOGY, Australia

OUTPUT: COM fiche.
UPDATE:
UPDATE: Semi-annual cumulation.

EQUIPMENT: Canon Canorama 400.

COSTS: Canon Canorama 400: under $200 (bulk purchase).

Comparative (catalog production July 1975):

	Photocomposition	COM fiche
10 sets	$ 5,660	$ 570.19
20 sets	5,901	700.09
50 sets	6,624	1,089.79

COM original: $0.032/frame.
Duplicate fiche: $ 0.213/fiche

COMMENT: Discuss the cost effectiveness of using COM fiche catalog vs. photocomposed catalog; and cost of supplements ws. cumulations.

SYSTEM: TULSA JUNIOR COLLEGE, Oklahoma

OUTPUT: COM.

SYSTEM: UNIVERSITAIRE INSTELLING OF ANTWERP

OUTPUT: COM.

SYSTEM: UNIVERSITY OF ASTON LIBRARY

CATALOG: Monographs (since 1972). Over 30,000 MARC records. In AU/TI, and classified catalogs.

OUTPUT: COM film: 16 mm, roll, in VSMF cassette.
AU/TI catalog in 6 VSMF cassettes.
Classified catalog in 3 VSMF cassettes.

EQUIPMENT: Microscot "Planet" manually-operated roll-film readers (accept VSMF cassette) (16).
Microscot "Mecur" mechanized roll-film reader (accept Caps cassette) (1).
CIL 600 series readers (2).

REACTION: Poor film quality.

COMMENT: COM bureau representative stated that only libraries are using roll-film microfilm, and approx. 95% of their business is for fiche. University of Aston is experimenting with fiche.

SYSTEM: UNIVERSITY OF BATH LIBRARY

CATALOG: 70,000 Titles.

RECORD: Shortened entries.

OUTPUT: COM.

SYSTEM: UNIVERSITY OF BIRMINGHAM

CATALOG: 1 M cards. Machine readable entries.

OUTPUT: COM film (for entries after January 1972)
Film (conventional microfilming for retrospective card catalog conversion - housed on 63,000 ft reels of film): 16 mm, 8 entries/frame, comic mode, in cassette.
52 cassettes for AU catalog, 30 cassettes for class. catalog.

UPDATE: Monthly for COM.
18 Months for card catalog on film.

PRODUCTION: COM plus filmed old catalog.

EQUIPMENT: CIL 600. Have been inexpensive to maintain, hardy and compact.

COSTS: Estimated:

First year:	7,263
Annual recurrent:	3,091
Non recurring for readers and cassette holders:	4,172

REACTION: Much initial staff resistance. Very little user resistance. No queuing problems so far. Had seminars for staff and users.

COMMENT: University of Birmingham is conducting an experiment on using microfiche.

SYSTEM: UNIVERSITY OF CALIFORNIA, Berkeley

CATALOG: In-Process-File.

OUTPUT: COM.

SYSTEM: UNIVERSITY OF GUELPH LIBRARY

CATALOG:
1) In-Process-File.
2) Union list of the coded documents of 8 other Ontario academic libraries.
   Catalogs: AU/TI, and Shelf list (both in 5 subject divisions).
3) Government documents, technical reports (arranged by per. AU, TI, copr. AU, series, serial, and keyword SU).
   125 fiches of ver 150,000 records.
4) Serials catalog. 8,500.
   Holdings of 11 members of the CUSS (Co-operativve Union Serials System) of the Universities Co-operative Library System.

OUTPUT: COM fiche: 48X R.

UPDATE: Weekly cumulation (for In-Process-File).
3 times a year (for gov"t docu. & tech. report).

PRODUCTION: Information recorded on coding sheet. Then, input the information to magnetic tape using a CRT terminal.

COSTS: Comparative:

	COM	Paper
Monograph catalogs (8 copies, 3 times a year):	$ 1,500/run	$ 20,000/yr.
Serial lists (26 copies, monthly):	50/run	360/run
Gov't & Tech. (10 copies, 3 times a year):	500/run	5,000/run

COMMENT: The advantages of COM are cheaper, more compact, and more accessible.

SYSTEM: UNIVERSITY OF SURREY LIBRARY

RECORD: Shortened entries.

OUTPUT: COM film: in cassette.

EQUIPMENT: Scottish Instruments Ltd. Planet readers (manually operated).

SYSTEM: UNIVERSITY OF TORONTO LIBRARIES

CATALOG: 1.25 M titles.

RECORD: FBR in call # order.
AU, TI, and SU indexes to the FBR have brief entries:
AU, TI, imprint date, call # and copy information.

OUTPUT: COM fiche: 48X R, 514 diazo.
COM film: 48X R, 16 mm, vesicular, 2.5 mils thick.
Retrospective catalog is printed on film and fiche.
Supplements are on fiche only.
COM film catalog contains nearly 4.3 M entries.
Supplement for 6 months period added 77,000 records on 42 fiche.

UPDATE: Bimonthly.

PRODUCTION: 9 members group called Inplementation Team for Data Base Integration and App;ication (ITDBIA) of the University of Toronto anlayzed and monitored the conversion project.

EQUIPMENT: For fiche:
Bell & Howell SR-IV viewer, equipped with a 17 mm lens giving 50X magnification. (43)
The fiche are stored in Ring King Visible or Eichner modular fiche stands.
For film:
Information Design ROM 3 COM terminal, a motorized viewer achieving 39X magnification. (59)

REACTION: Microform quality need improvement.

COMMENT: "Don't use fiche. They are difficult to keep in proper order, easy to lose or mutilated, and more work for the user to position." All the bibliographic information are located tightly together making it difficult to read.

SYSTEM: UNIVERSITY OF WISCONSIN - Stout Library

CATALOG: Public catalog set. Periodical holdings. Film catalog. UW-system video tape catalog. Index to Wisconsin public documents.

OUTPUT: COM fiche: 4" x 6", 42X R, 207 frames/fiche.

EQUIPMENT: Dual lens fiche readers (for 24X and 42X).

COMMENT: Fiche readers are less expensive than film readers.
Proposal to provide reader for every department.
Student residence hall has reader & COM catalog, provided by a Higher Education Act Title VI-B grant.

SYSTEM: WAYNE STATE UNIVERSITY

CATALOG: Serials holdings. 1,400 pages.

OUTPUT: COM film: 16 mm, 24X R, in cassette.

PRODCUTION: COM.

EQUIPMENT: Memorex 1644 autoviewer. 11 x 14 screen.

SYSTEM: WESTERN KENTUCKY UNIVERSITY (WKU)

CATALOG: 1.3 M cards.

RECORD: FBR in AU/TI, and SU arrangements. Provisions contained in the ISBD(M) were precisely followed.

OUTPUT: COM fiche: 4" x 6", 48X R, 270 frames/fiche (listed 58 bibliographic entries).
The master AU/TI catalog has 376 fiche, master SU catalog is represented on 221 fiche. Supplement: 18 AU/TI, and 13 SU fiche.

UPDATE: Monthly, and following supplements are cumulated.

PRODUCTION: Records on machine readable tapes are generated in the WKU Technical Services Section using IBM 2747 terminals linked to a campus IBM 360/40. The tapes are sent to a commercial data processing center in Louisville Kentucky for COM production.

EQUIPMENT: Fiche readers.

COMMENT: High level of acceptance of the COM.

SYSTEM: YALE UNIVERSITY

CATALOG: In-Process-File. Sent to 12 locations within library system.
80,000+ entries, required 2000 pages.

OUTPUT: COM. Film.

COMMENT: Sold to other libs. More current, cheaper. More access pts. to Yale collection than in NUC. Evaluated speed of search film vs. paper. Average search time in min., film vs. paper = 1.0. vs. .783.

OTHER UNION SYSTEMS

SYSTEM: ANOKA COUNTY LIBRARY - COMCAT, Minn.

CATALOG: 5 vols printed book catalog and its 3 supplements.

OUTPUT: Film.

SYSTEM: ARROWHEAD LIBRARY SYSTEM (a consortium of 28 libraries in the Duluth area), Minnesota

OUTPUT: COM film

PRODUCTION: Library Interface System, Inc. will prodcue the catalog.

EQUIPMENT: Information Design ROM 3 terminals.

SYSTEM: AUSTIN PUBLIC LIBRARY, Texas

OUTPUT: COM film: roll.

PRODUCTION: The Computer Center of the City, which had published the automated hardcopy catalog, will produce COM film.

EQUIPMENT: Information Design ROM 3 terminals.

SYSTEM: BALTIMORE COUNTY, Maryland

CATALOG: 20,000 titles added/year.

OUTPUT: Film: 500 foot reel locked in cabinet of ROM 2 viewer. Each reel holds 30,000 pages.

EQUIPMENT: ROM 2 reader.

COSTS: $25,000 -$40,000 cheaper per year than book catalog.

COMMENT: Decided against fiche because "...we couldn't see a library patron handling a bunch of fiche and getting them all back in order..."

SYSTEM: BLACK GOLD LIBRARY SYSTEM, California

OUTPUT: COM film.

PRODUCTION: BroDart will produce the catalog.

EQUIPMENT: Information Design ROM 3 COM terminals.

SYSTEM: BRIGHTON , England

CATALOG: Acquisitions since 1971. 12,000/year.
A/T/PRECIS SU index.

RECORD: Printed BNB

OUTPUT: COM film: 16 mm.

UPDATE: Monthly.

PRODUCTION: COM.

SYSTEM: CHESHIRE COUNTY, England

CATALOG: Adult non-fiction. 40,000+ titles added annually.

OUTPUT: COM film: 16mm, 20 entries/frame, in cassette, 2000 frames/cassette.

UPDATE: Monthly.

PRODUCTION: A 4 week intervals magnetic tape is produced containing all titles added to the stock since last annual cumulation. This tape is processed at a COM bureau.

COMMENT: Used for ILL, ordering.

SYSTEM: CLARK COUNTY PUBLIC LIBRARY; Las Vegas, Nevada

OUTPUT: COM film.

PRODUCATION: Science Press (Ephrata, Pennsylvania) will handle the conversion.

EQUIPMENT: Information Design ROM 3 COM terminals. (30)

SYSTEM: COOK COUNTY SHERIFF'S POLICE LIBRARY; Maywood, Ill.

OUTPUT: COM FILM.

PRODUCTION: Science Press (Herndon, Virginia) will convert their holdings to make machine readable form and supply COM.

EQUIPMENT: Information Design ROM 3 readers.

SYSTEM: CORNWALL COUNTY PUBLIC LIBRARIES, England

CATALOG: 30,000 records. AU, classified catalog.
4 years of additions.

RECORD: FBR, and location code.

OUTPUT: COM film: 16 mm, comic mode, in cassette.

UPDATE: Quarterly.

PRODUCTION: Cornwall County Library uses an ICL 1902 A computer. A conversion program was done to generate magnetic tapes in format for the COM recorder. Quarterly tapes are send to a COM bureau for production.

EQUIPMENT: Scottish Instruments NCR Satellite 2 W comic mode reader.

COSTS: Comparative (for 30 copies w/ Quarterly Cum.):

	Printed	COM
1970	195	91.18
1971	507	119.84
1972	819	241.24

REACTION: Favorable. User survey shows 92% interviewed had no difficulty in using the COM catalog, and 76% preferred the COM to card system.

SYSTEM: EAST BAY COOPERATIVE; San Francisco, CA

OUTPUT: COM.

SYSTEM: EAST SUSSEX COUNTY LIBRARY SERVICE

OUTPUT: COM.

SYSTEM: ENOCH PRATT FREE LIBRARY

OUTPUT: COM film

PRODUCTION: Auto-Graphics, Inc. (Montery Park, CA) will supply Pratt with processing services, film, and microfilm readers.

EQUIPMENT: Auto-Graphics LCR 1100 microfilm readers. (210).

SYSTEM: FAIRFAX COUNTY PUBLIC LIBRARIES-COMCAT, Virginia

CATALOG: Total adult collection owned by the library system: 147,210 titles.

OUTPUT: COM film.

UPDATE: Bimonthly.

COSTS: COMCAT (including readers and microfilm):
For one year: $ 114,717
Ongoing: $36,025/yr
First year saving compare to using book catalog: $ 90,000.

SYSTEM: FORSYTH COUNTY PUBLIC LIBRARY; Winston-Salem, North Carolina

OUTPUT: COM film.

PRODUCTION: Science Press (Ephrata, Pennsylvania) maintains the computerized catalog data base of the library and prepares COM film for the ROM retrieval equipment.

EQUIPMENT: Information Design ROM 3 COM terminals. (20).

SYSTEM: HARFORD COUNTY PUBLIC LIBRARY, Maryland

CATALOG: All holdings since January 1974.

OUTPUT: Film.

COMMENT: Older material will be incorproated. Project motivation was increased by the opening of a new branch, which would have needed a good deal of expensive card catalog furniture.

SYSTEM: HILDALGO COUNTY LIBRARY SYSTEM; McAllen, Texas

CATALOG: Union catalog containing the major collection of Mexican-American materials (collection represents materials in English and Spanish, in books, video tapes, films, record and art).
200,000 titles.

OUTPUT: COM film.

UPDATE: At least 4 times a year.

PRODUCTION: Science Press will manage the bibliographic data base and produce film.

EQUIPMENT: Information Display hardware.

COSTS: Funded by the Tinker Foundation of New York and the Trull Foundation of Texas.

COMMENT: Future editions of the COM catalog will include the Audio-Visual collection.

SYSTEM: HOUSTON PUBLIC LIBRARY

CATALOG: Install COM catalog in 4 new branches as a step toward the eventual conversion of its entire catalog to COM.

OUTPUT: COM film.

PRODUCTION: Library Interface Systems, Inc. (Minnetonka, Minnesota) will produce the software.

EQUIPMENT: Information Design (Menlo Park, CA) will provide the hardware.

SYSTEM: LASER (LONDON AREA SOUTHEASTERN LIBRARY REGION)

CATALOG: Monographs part of Recon project.
Union catalog by standard book # from 1970 on, 1964 to 1969 by BNB serial #.

OUTPUT: COM film: 16mm.

UPDATE: Bimonthly.

SYSTEM: LONDON BOROUGH OF CAMDEN

OUTPUT: COM film: 16 mm, roll, negative polarity.

SYSTEM: LOS ANGELES COUNTY PUBLIC LIBRARY

OUTPUT: COM film.

EQUIPMENT: Information Design Inc. ROM 3 terminals. (500).

SYSTEM: LOS ANGELES PUBLIC LIBRARY

CATALOG: 4 M vols.
Over 700,000 titles.
50,000 serial titles.

OUTPUT: Fiche.

REACTION: "...preponderately favorable" Used by librarians only. Wider distribution "appreciated..."

SYSTEM: MARIN COUNTY LIBRARY, CA

CATALOG: 100,000 (expected in June 1975).

OUTPUT: COM fiche.

SYSTEM: MITCHELL LIBRARY

OUTPUT: Film, roll.

SYSTEM: NEW YORK PUBLIC LIBRARY

CATALOG: Authority File.
Book-In-Process List.

OUTPUT: COM film.

EQUIPMENT: 1642 manual Memorex for public.

REACTION: Took longer to find entries on film than on card. "Quite a few readers complain of dizziness or headaches." One reader with thick glasses was "unable to use microfilm machines at all." Staff found MF acceptable sub. for authority file but preferred book catalog.

COMMENT: Goal was evaluation of MF catalog for public and staff.

SYSTEM: PALM BEACH COUNTY PUBLIC LIBRARY SYSTEM, Florida

OUTPUT: COM film.

PRODUCTION: Science Press (Ephrata, Pennsylvania) will manage the data base.

EQUIPMENT: Information Design will supply ROM 3 COM terminals.

SYSTEM: RAISIN VALLEY SYSTEM, Michigan

CATALOG: 45,000 titles of the 200,000 titles in the system are on COM catalog (Jan 1976).
130,000 titles will be on COM (by April 1976).
Then, all 200,000 titles will be on COM (by Jan 77).

OUTPUT: COM film: 16mm, 42X R.

UPDATE: Quarterly.

PRODUCTION: COM catalog produced by Inovar, Inc. (Los Altos Hills, CA).

EQUIPMENT: Information Design microfilm readers (30).

COSTS: Comparative (on annual basis, w/ quarterly updates):

COM	$ 5,300
Book	11,000
Card	24,000

Readers (30): $ 22,000.
Funded by the Michigan State Library, under the LSCA: $ 46,500.

SYSTEM: PUBLIC LIBRARY OF COLUMBUS AND FRANKLIN COUNTY (PLCFC), Ohio

CATALOG: 250,000 titles.

OUTPUT: COM film.

COSTS: PLCFC will rent its 250,000 titles data base for COM film catalog conversion use for: $ 2,500.
COM costs $ 48,000/yr for maintenance (includes 4 quarterly recumulations, 100 film reels and indexes, and maintenance fee fro 1,000 readers).

SYSTEM: RAMAPO-CATSKILL LIBRARY SYSTEM, N.Y.

CATALOG: 60,000 SU entries for books throughout the system.

OUTPUT: 178 microfiche. 50 sets. Fiche marked 1 of 178, 2 of 178, etc. When fiche file reaches 15", will color code.

EQUIPMENT: Atlantic FGG Readers.

COSTS: 1/4 cost of previous book catalog.

REACTION: File integrity has been no problem.

COMMENT: Speeds ILL. Fiche are easy to file, find, retrieve, copy, store and regroup.

SYSTEM: ST. LOUIS COUNTY LIBRARY.

CATALOG: 1/2 M cards.

OUTPUT: COM film.

UPDATE: Qua Quarterly.

PRODUCTION: The Inovar Division of BroDart, Inc. is handling the conversion of data for display on 110 Information Design ROM 3 COM terminals.

EQUIPMENT: Information Design supplied ROM 3 microfilm readers. (110).

COSTS: COM system: Initial: $ 75,900 (110 readers)
20,000 (converting 150,000 titles to a computer data base)
Operating: 50,000/yr (to maintain; includes 110 copies of Quarterly updates).
$ 70,000 can be saved by eliminating the card catalog.

SYSTEM: SALT LAKE COUNTY LIBRARY SYSTEM

CATALOG: Union catalog, Xerox Book Catalog(XBC).

OUTPUT: COM film.

PRODUCTION: The microfilm catalog system will be produced by Autographics. It will first take in new acquisitions, then absorb the library union catalog and XBC.

EQUIPMENT: Plan to buy over 50 readers.

SYSTEM: SHROPSHIRE COUNTY, England

CATALOG: Adult and juvenile non-fiction.
40,000 + titles over 3 years.

OUTPUT: COM fiche: 42X R, 208 pages/fiche, 20 entries/page.
Entries run across page L to R.
Choose fiche, more prtable, slightly cheaper.
18 fiche altogether.

COMMENT: Chose COM because catalog updated weekly. Long term plan is for all branches trailers, mobiles to have MF copies. COM made it economically possible for the first time for all branches to have a catalog. Before only area libraries had catalogs. Now branches have AU, and classified catalog of whole county continually updated and with locations.

SYSTEM: TECHNISCHE HOGESCHOOL EINDHOVEN

CATALOG: 100,000 titles in catalogs: AU, TI, and classfied.

RECORD: Based on MARC format.
OUTPUT: COM fiche: 42X R.

UPDATE: Semiannual cumulation; monthly cumulation.

EQUIPMENT: Burroughs N 9821 (magnetic tape typewriter). Then changed to Datapoint 2200.

COMMENT: Study is being made to make the system compatiable with PICA (Project for Integrated Catalogue Automation).

SYSTEM: TULSA CITY-COUNTY, Oklahoma

CATALOG: 50,000 titles (as of Jan 1975).

OUTPUT: COM fiche.

SYSTEM: WEST SUSSEX COUNTY LIBRARIES

OUTPUT: COM.

SYSTEM: WESTMINSTER CITY LIBRARIES

CATALOG: 750,000 vols.
75% non-fiction. Since '70 all non-fict. incl. IP and On order are output via COM (over 70,000 titles)
Pre '70 still in card file.
AU/Class. cat. on COM.
SU cat. is printed.

RECORD: Fixed format. Upper case only. Contains ISBN, DDC, AU/TI/Imprint, Proc. & control info., loc., and shelving info.

OUTPUT: COM film: 16 mm, roll, negative polarity, cine mode, in Memorex cassette, thin base plyester.
Memorex cassettes: 3,000 frames/cassette, 60,000 entries/cassette.
Film chosen over fiche because of feeling that eventually 20,000 fiched pages would become too cumbersome; and because of fear of vandalism.

UPDATE: Monthly.

EQUIPMENT: CAPS Mercury mortorized reader "...clearly preferred by public..." to manual reader. Very few maintenance problems. Machines at standing height with simple instructions.
Began with Memorex 1642 reader (non-motorized).

COSTS: Readers: 135 each
Maintenance charges for the readers are estimated at 5% per year of the purchase price.
Cassette holder: 1 each.
Duplication: 1.25 per 100 ft (2000 frames).

REACTION: No reported problems in changing cassettes. acceptance" ...has been exceptionally good...all types of users have adapted quickly to new format, and some consider it an improvement over card catalog." Eyestrain reported "...only for some" who used it continuously over long periods. "On present experience we no longer have reservations about a catalog on microfilm or about the use that will be made of it"
Some though COM easier to use than card or printed catalog.

COMMENT: Experience with COM so successful that planning COM for children's and music collection. Have concerns over whether readers will hold up. One reader per cassette of film in public areas so avoiding the need for public to change cassettes.

SYSTEM: WINNIPEG

CATALOG: 150,000titles. 225,000 vols.

OUTPUT: 61 cartridges. Code book identifies proper cartridge.

UPDATE: Annual and weekly checklists.

SPECIAL LIBRARIES

SYSTEM: ALIRT (Analytic Library Information Retrieval and Transfer), Canada

CATALOG: Union catalog of the libs. of 3 companies (i.e. Bell-Northern Research, Northern Telecom Ltd., Bell Canada (and BNR Inc (in Calif) - subsidiary of Bell-Northern Research).
AU, TI, SU, & Keyword catalogs.

OUTPUT: COM fiche: 4" x 6", 48X R, 270 frames/fiche.
Entire catalog is on 28 fiche.

PRODUCTION: Contracted a service bureau to produce the fiche from tapes currently produced.

COSTS:
Entire catalog on fiche: $ $ 126
Additional set $ 7/set
Comparative:
12 sets of paper catalog: $ 1,400
25 sets of fiche catalog: 313

REACTION: "Entirely favorable..." More people used the catalog than had ever done so before.

SYSTEM: Boeing Company, Washington

CATALOG: 150,000 titles (as of Jan 1975).

OUTPUT: COM fiche.

REACTION: Complained that the catalog was "hard on the eyes" and that the machines wer difficult to use.

SYSTEM: Cornell-Museum.

OUTPUT: Film.

COMMENT: Cornell films Indonesian museum's card catalog & provides museum with copy.

SYSTEM: EASTMAN KODAK COMPANY LIBRARIES

CATALOG: Union catalog for 5 libs.
28,500 records.

RECORD: AU,TI, publishing information, note, SU, LC class. #, Dewey #, Accession # for computer input; in upper case and lower case characters.

OUTPUT: Fiche: 4" x 6", 42X R; arranged in 25 columns. 95 fiche for the Union catalog: 24 TI, 31 AU, and 40 SU fiche (as of the beginning of 1977).(COM).

UPDATE: Monthly.

PRODUCTION: Input is from several locations by magnetic tapes using IBM MTST, or by keypunched cards. Data Processing uses IBM 360/370. And output is by Kodak KOM-90 Microfilmer. Processing done in batch mode.

EQUIPMENT: Kodak Ektalite 140 viewers. Reader/printer.

COSTS: Kodak viewers: $ 100 each.

COMMENT: Advantage: low cost.
Disadvantage: misfile the fiche after use.

SYSTEM: HUGHES COMPANY

CATALOG: Union catalog to serve 12 technical libraries.
26,000 vols. on 160,000 cards.
Hughes Aircraft Company Internal Document System catalogs.

OUTPUT: COM film: 16mm, in cartridge.

UPDATE: Originally, every 4 months cumulation. Now, semiannual cumulation is used.

EQUIPMENT: Lodestar Reader.

COSTS: Estimated savings of over $ 20,000 over 10 years.

REACTIONS: Takes longer to locate items (estimate 40 secs. vs. 20 secs. for card catalog. "The ease with which the sys. was inaugurated at the branch has been quite gratifying." User acceptance-successful.

COMMENT: Branch is small so one reader per branch is no problem. Microfilm catalog production method was chosen rather than printed book catalog or card catalog because of having the lowest cost. Successful experience with microfilm technology at Hughes. Recommend this approach to libray system with materials spread throughout many locations.

SYSTEM: IMPERIAL CHEMICAL INDUSTRIES LIMITED-Mond Division Library

CATALOG: 16,000 Documents.

OUTPUT: COM film.

COSTS: Estimated: 100 to provide a microfilm reader and a copy of the COM catalog.

REACTION: Favorable.

SYSTEM: LOCKHEED

CATALOG: 1 M+ entries(film), 175,000 titles (fiche, as of Jan 75).

OUTPUT: COM fiche.
Film: 16mm. 40 cartridges, 100 each, 1800-2 col. pages. 14 entries/page. this replaces 720 catalog drawers.

UPDATE: Quarterly (for film).

EQUIPMENT: Bell & Howell Model 531 with zoom lens.
2:1 readers: patrons.
1:1 readers: staff.

COSTS: Operates at net savings of $ 13,000 annually because of no card filing, no catalog card cases, 200% space savings.

REACTION: Complained that the catalog was "hard on the eyes" and that the machines were difficult to use.

COMMENT: Catalog at work space allows staff to be more efficient.

SYSTEM: NATIONAL PROTRAI GALLERY

CATALOG: Catalog of American Portraits.

OUTPUT: Fiche.

COMMENT: Allows dissemination of massive data base.

SYSTEM: SMITHSONIAN INSTITUTION

CATALOG: Serials list. In-Process-File.

OUTPUT: COM film.

EQUIPMENT: Information Design ROM 3 COM terminals.

SYSTEM: UNILEVER RESEARCH LIMITED LIBRARY, United Kingdom

OUTPUT: COM film: 16mm, roll.
4 Types of catalogs: AU, SU, classified, and accession #; are held in 2 VSMF type cassettes.

SYSTEM: UNITED AIRCRAFT RESEARCH LABS.

CATALOG: 53,000 tech. reports.

OUTPUT: 2 100' rolls of 16 mm film.

COMMENT: Advantages: 95% reduction/bulk.
Low cost of film duplication.
Ease of handling.

THE USE OF AN ON-LINE MICROFICHE CATALOG FOR TECHNICAL SERVICE AND RETRIEVAL OF BIBLIOGRAPHIC DATA

Section III. Operator's Manual

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1 April 1979

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OPERATOR'S MANUAL

This system consists of a minicomputer (known locally as the Level 6), with CRT and printer, a fiche reader, and a "remote" computer (locally, the IBM 360-91, housed in Math Sciences). (See photograph, next page.) This operator's manual specifies how to use the equipment, and also will explain how the machine programs function and how they interrelate. In examples, the notation "C" indicates the messages on the CRT screen. "Y:" shows what you respond.

1. HARDWARE

Make sure all equipment — computer, computer terminal, and microfiche CARD unit — are plugged in.

Make sure all power switches are "on."

A) The power switch for the level 6 is on the left of the machine; push the switch up.

B) The power switch for the diskette handler is under the red "0" on the diskette panels. (It is on the left side of the machine, and should have been left in the "on" position.)

C) The switches for both CRT's have probably been left on, but check the slide switch in the rear. It should be on "local copy". The "character" toggle switch should be down. (This is true for right hand CRT only.)

D) The switch for the fiche reader is on the lower right side of the reader. Push the toggle switch up. Also, make sure the toggle switch on the far left is set for "remote," and not "manual."

E) Start the printer nearest the fiche unit by pushing the start button on the far left of its control panel.

The Computer. Load your diskettes.

A) Press the lever below the panels down, to open the diskette panels.

B) Remove the diskette from its outside envelope.

C) Carefully position CRDSYS diskette into Handler 0, making sure it is all the way into the handler. (See Figure 1)

CENTRAL TERMINAL
DIRECT COMMUNICATION
DIAL–UP
MINICOMPUTER
CRT MONITOR

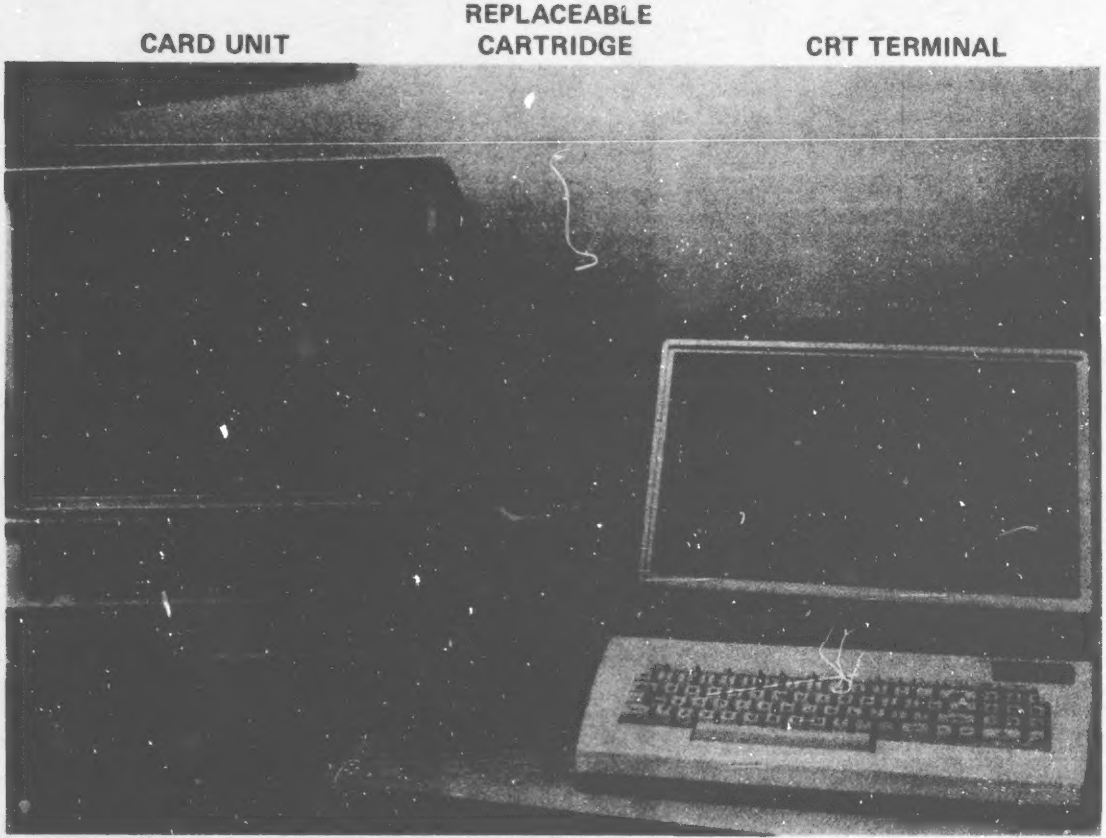
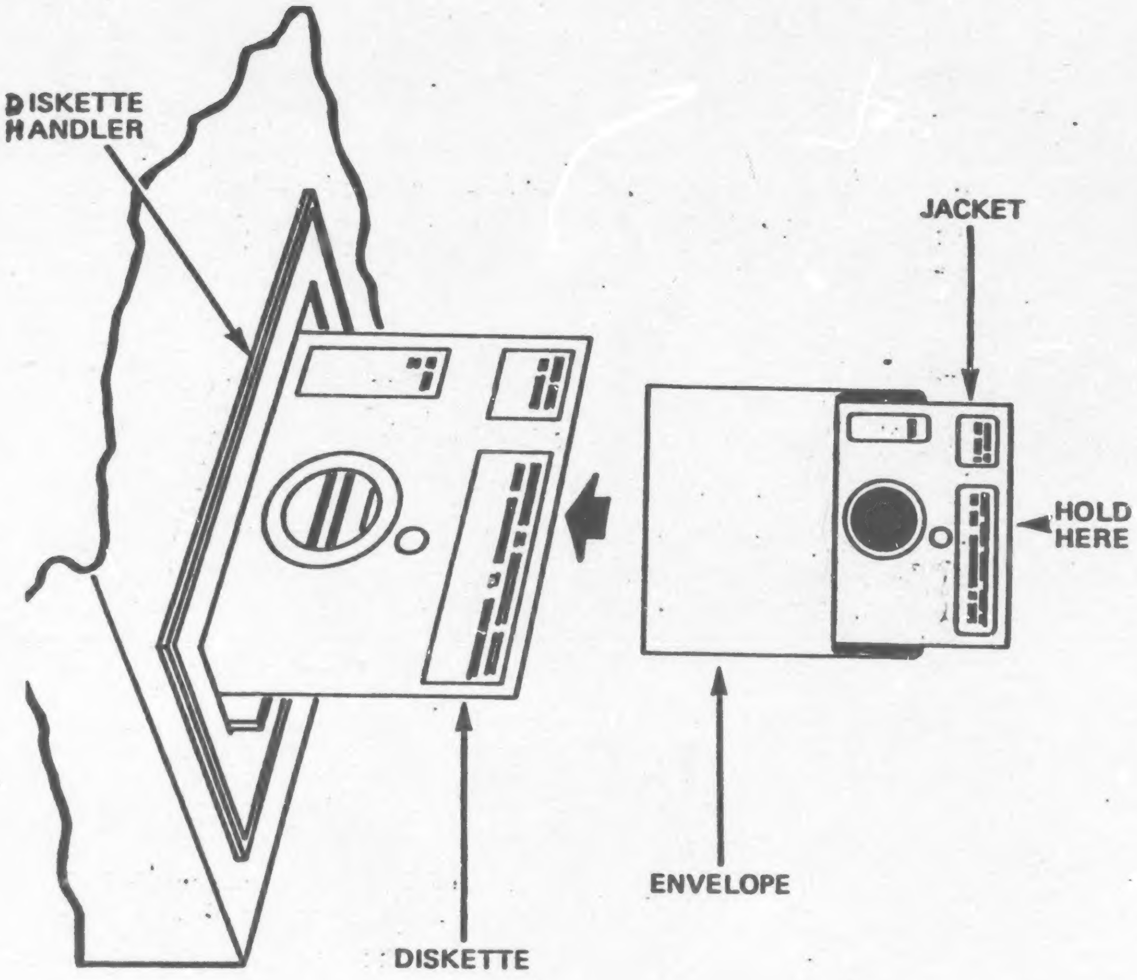
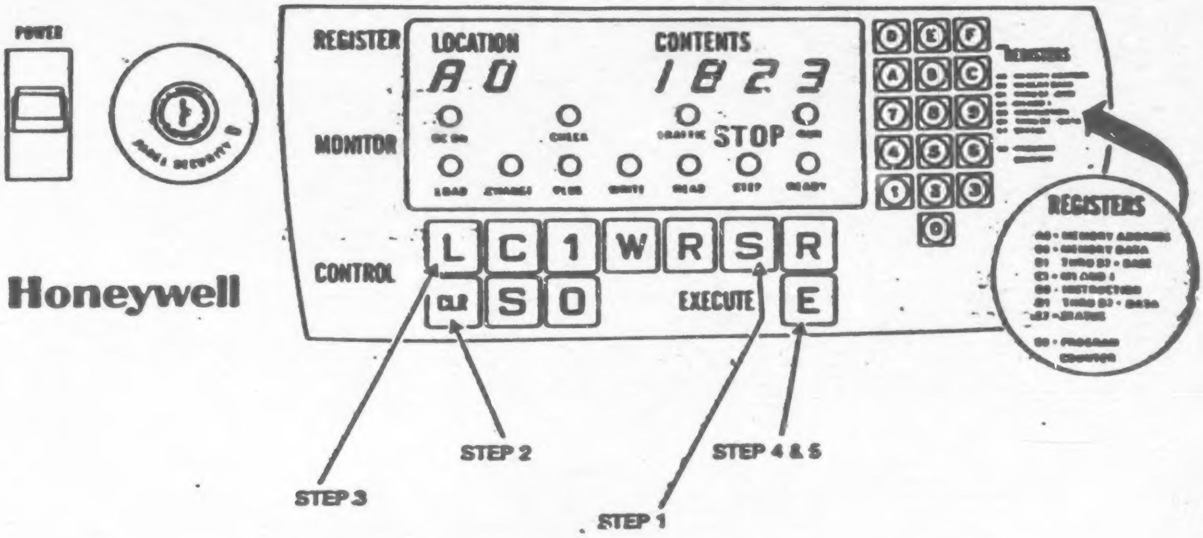

CARD UNIT
REPLACEABLE CARTRIDGE
CRT TERMINAL

Figure 1.



Diskette Loading

Figure 2.



FULL PANEL

Central Process Procedures

D) Close the panel.

E) Position your data diskette in the other handler, making sure it is all the way in.

F) Close the panel.

G) The diskette spindle engages automatically.

Next, the Level 6 must be "initialized" (or bootstrapped, or booted.) Locate the panel of lights and buttons to the right of the panel security keys. This is called the Central Processor Control Panel. (See Figure 2)

A) Press the S (stop) push button.

B) Press the CLR (clear) push button.

C) Press the L (load) push button.

D) Press the E (execute) push button.

Loading (data being stored in the memory of the Level 6) is initiated, and terminates after about two seconds. This is indicated by the red traffic lamp being turned off. If the red "check" light remains on then something serious is wrong.

E) When the red traffic lamp is turned off, press the E (execute) push button again.

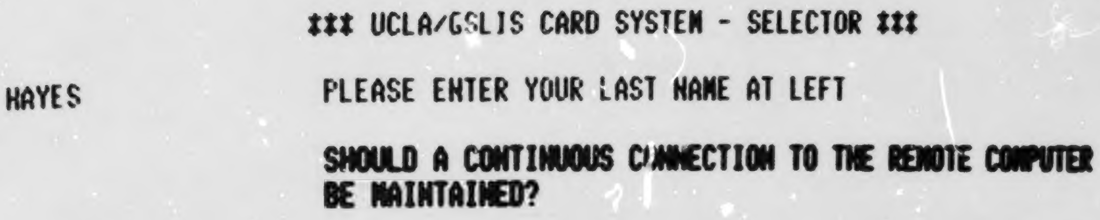
Loading continues of about 75 seconds and when it is complete, the CRT screen displays the statement:

C: PLEASE ENTER YOUR LAST NAME AT LEFT

Total system loading requires approximately 90 seconds.

The CRT Screen and Keyboard. The "cursor" is the green rectangle which acts as a place marker on the CRT screen; it moves to the right with each character you type. If you wish to move the cursor forward, backward, up, or down on the screen, you use the four "arrow" keys on the top line of the keyboard: "←" moves the cursor backward, "↑" moves it up, "↓" moves it down, "→" moves it forward. These are especially useful when you must correct typing errors. If you wish to move the cursor back to the left margin, hit the "Return" key.

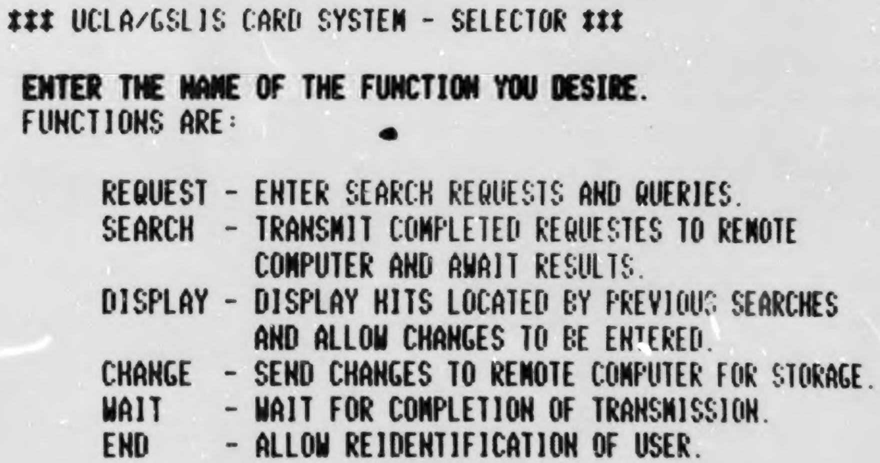
Entering Information. Entering information is a two step process. First, type the information on the keyboard; the CRT screen shows the copy. Make any corrections by moving the cursor via arrow keys. Second, press the "XMIT" ("Transmit") key. This transmits all information between



```
                    *** UCLA/GSLIS CARD SYSTEM - SELECTOR ***

HAYES               PLEASE ENTER YOUR LAST NAME AT LEFT

                    SHOULD A CONTINUOUS CONNECTION TO THE REMOTE COMPUTER
                    BE MAINTAINED?
```



```
*** UCLA/GSLIS CARD SYSTEM - SELECTOR ***

 ENTER THE NAME OF THE FUNCTION YOU DESIRE.
 FUNCTIONS ARE:

      REQUEST - ENTER SEARCH REQUESTS AND QUERIES.
      SEARCH  - TRANSMIT COMPLETED REQUESTES TO REMOTE
                COMPUTER AND AWAIT RESULTS.
      DISPLAY - DISPLAY HITS LOCATED BY PREVIOUS SEARCHES
                AND ALLOW CHANGES TO BE ENTERED.
      CHANGE  - SEND CHANGES TO REMOTE COMPUTER FOR STORAGE.
      WAIT    - WAIT FOR COMPLETION OF TRANSMISSION.
      END     - ALLOW REIDENTIFICATION OF USER.
```

the left margin of the CRT screen and the cursor's position to the Level 6 for processing.

2. LOGGING IN

The CRT displays the statement:

C: PLEASE ENTER YOUR LAST NAME AT LEFT

You should respond by entering your last name

Y: WORTH (If your last name were WORTH.)

The Level 6 then verifies your name as a recognized user.

Next, the CRT displays the statement:

C: SHOULD A CONTINUOUS CONNECTION TO THE REMOTE COMPUTER BE MAINTAINED?

Please type "N" or "Y." If the response is "Y" (yes) a TSO (Time Sharing Option) session is created and left online (accruing connect charges). To connect the Level 6 to the 360-91, you must press the "ring" button on the cream-colored box sitting on top of the Level 6. Hold it in for one full second (Count "One, Mississippi"). The red light indicating "connect" should come on. If not, push disconnect, wait 10 seconds, then push Ring again.

Type "N" for batch searching. The "N" (no) response means the TSO session is created only as needed, and logged off after each use to minimize connect time charges.

3. The REQUEST Processor

C: ENTER THE NAME OF THE FUNCTION YOU DESIRE

Please enter the word REQUEST.

Y: REQUEST

REQUEST is used to enter, and later to correct search requests, prior to their being sent to the remote computer. Upon initial entry to the REQUEST Processor, if the old requests exist in the file these are summarized on the CRT screen. Clear the file by entering the DElete command:

Y: DE*

```
                    *** UCLA/GSLIS CARD SYSTEM - REQUEST ***

  THE FOLLOWING SEARCH CRITERIA ARE AVAILABLE.
  THESE AND THEIR REQUIRED QUALIFIERS ARE:
      A=     FULL AUTHOR
      T=     FULL TITLE
      AK=    TRUNCATED AUTHOR KEY
      TK=    TRUNCATED TITLE KEY
      ATK=   TRUNCATED AUTHOR-TITLE KEY
      L=     LIBRARY OF CONGRESS CARD NUMBER
      R=     SANTA CRUZ REGISTRY NUMBER
      G=     GSLIS NUMBER
  SEARCH NUMBER     1
  R=8023049+8023174+9010742+9025777+8831216




   COMMAND?
```

```
                    *** UCLA/GSLIS CARD SYSTEM - REQUEST ***

THE FOLLOWING REQUESTS EXIST. IF YOU WISH TO START OVER TYPE DE *.
SEARCH                                SEARCH
NUMBER       SEARCH STRING            NUMBER       SEARCH STRING
-------------------------------------------------------------------------------
  1  R=8023049+8023174+9010742+9025777    2  AK=PLATO * TK=DIALOGUES




COMMAND?
```

Commands. Valid commands (DE* and others) are as follows:

SU - summarizes the current status of requests. Displays initial summary screen at any time (while in REQUEST).

DEnum - deletes the request whose search number is "num" from the REQUEST file. If "num" is omitted, the current request is deleted.

DE* - deletes all requests in the REQUEST file. This command is used to start fresh before entering a new set of requests.

GOnum - displays for update the request whose search number is "num." If "num" is omitted, the REQUEST processor positions itself at the first available search number in the file to allow a new request to be entered.

Format of Requests. There are eight methods of searching bibliographic data: by author, by author key, by title, by title key, by author-title key, by registry number, by LC number, and by GSLIS number. Indicate which function you use by its abbreviation:

author-	A=
author key-	AK=
title-	T=
title key-	TK=
author-title key-	ATK=
registry number-	R=
LC number-	L=
GSLIS number	G=

Requests via numbers, therefore, are fairly straightforward. For example:
R= 8095273
L= 68-16577
G= 56

Requests by author, author key, title, title key, and author-title key deserve expalanation:

A=	full author names are formed by entering the author's name, last name first, and dates for a personal author. Corporate body names are entered as they normally appear. Neither may exceed 253 characters.

Example:
Y: A= SHAKESPEARE, WILLIAM, 1564-1616
Y: A= AMERICAN LIBRARY ASSOCIATION

Note:	You must leave a space or use commas between elements of the full author's name. Otherwise, the computer will not recognize each element as a separate word.

AK= 4,3,1	the author key is the truncated form of the author's name. The computer forms it by taking the first four (4) characters of the

first word of the author term, the first three (3) characters of the second word, the first (1) character of the third word. Do not include birth and death dates, or any elements following the dates -- appellations such as joint author, or editor. If a full author name contains fewer than three words, or if a word contains insufficient characters, the corresponding positions in the truncated author name are filled with blanks.

Examples:

b̸ = blank

Full author name	Truncated author name
SHAKESPEARE, WILLIAM	SHAKWILb̸
EVANS, G. EDWARD	EVANGb̸b̸E
PLATO	PLATb̸b̸b̸b̸
A B C SOCIETY	Ab̸b̸b̸Bb̸b̸C
ABC BATHING CLUB	ABCb̸BATC
3RD ST MARCHING SOCIETY	3RDb̸STb̸M
UNITED STATES DEPARTMENT OF STATE	UNITSTAD

Note: The computer does all truncating, and recognizes blanks or punctuation as breaks between words. You MUST, therefore, leave blanks or insert punctuation between the elements. You may enter author names as they normally appear, or you may shorten them to the 4,3,1 format (as long as you separate the elements at the correct intervals by using punctuation or by leaving blanks).

Examples:

b̸ = blank

Y: AK= SHAKESPEARE, WILLIAM

(The computer truncates this to SHAKWILb̸)

Y: AK= SHAK, WIL
(The computer truncates this to SHAKWILƀ)
Y: AK= AMERICAN LIBRARY ASSOCIATION
(The computer truncates this to AMERLIBA)
Y: AK= AMER LIB A
(The computer truncates this to AMERLIBA)

T= enter the full title of the work you request. The following words should not be keyed, when they occur as initial articles.

a
an
das
der
die
el
gli
il
la
las
l'
le
les
lo
los
the

Note: The program takes no notice of the language of the title, so an English title such as "DIE, YOU DOG" will be considered as beginning with an article, and should be entered as "YOU DOG".

Titles may not exceed 150 characters.
Example:
Y: T= EFFECT OF GAMMA RAYS ON MAN-IN-THE-MOON MARIGOLDS

TK=
3,2,2,1 the computer shortens full titles to form the truncated titles in the same way it shortens full author names to form truncated author names, except titles take a 3,2,2,1 format. That is, it consists of the first three (3) characters of the first word of the term, the first two (2) characters of each of the next two words, and the first (1) character of the fourth word. If there are insufficient characters in a word, or

fewer than four words in a title term, corresponding positions in the title key are filled with blanks.

Examples:

ƀ = blank

Full Title	Truncated Title
LAST OF THE MOHICANS	LASOFTHM
AM I YOUR BELOVED	AMƀIƀYOB
X THE UNKNOWN	XƀƀTHUNƀ
MEIN KAMPF	MEIKAƀƀƀ
1066 AND ALL THAT	106ANALT

Note: The computer does all truncating and recognizes blanks or punctuation as breaks between words. You MUST, therefore, leave blanks or insert punctuation between the characters. You may enter titles as they normally appear, or you may shorten them to the 3,2,2,1 format (as long as you separate the characters at the correct intervals by using punctuation or by leaving blanks).

Examples

ƀ = blank

```
Y:   TK= LAST OF THE MOHICANS
         (The computer truncates this to LASOFTHM)
Y:   TK= LAS,OF, TH,M
         (The computer truncates this to LASOFTHM)
Y:   TK= AM I YOUR BELOVED
         (The computer truncates this to AMƀIƀYOB)
Y:   TK= AM I YO B
         (The computer truncates this to AMƀIƀYOB)
```

ATK=
4,4

truncated author-title keys are derived by pairing author with title terms. The computer makes each a 4,4 key; that is, it takes the first four (4) characters of the first word of the title. If in either term the first word has fewer than four characters, it is padded on the right with blanks to a length of four.

Examples: ƀ = blank

Author name	Title	Author-Title Key
SHAKESPEARE, WILLIAM	HAMLET	SHAKHAML
HAGGARD, H. RIDER	SHE	HAGGSHEƀ
LEE, BOURKE	DEATH VALLEY	LEEƀDEAT

Note: The computer does all truncating, and recognizes blanks or punctuation as breaks between words. You MUST, therefore, leave blanks or insert punctuation between the characters. You may enter the full form of the first word of the author and the title, or you may shorten them to the 4,4 format (as long as you separate the characters at the correct intervals by using punctuation or by leaving blanks).

Examples: ƀ = blank

Y: ATK= SHAKESPEARE, HAMLET
(The computer truncates this to SHAKHAML)
Y: ATK= SHAK,HAML
(The computer truncates this to SHAKHAML)
Y: ATK= HAGGARD, SHE
(The computer truncates this to HAGGSHEƀ)
Y: ATK= HAGG SHE
(The computer truncates this to HAGGSHEƀ)

Author-title keys are very valuable. Any author and title combination forming an author-title key can call up a work for which those authors and titles have been indexed. Suppose, for example, you have a work containing Shakespeare's Hamlet, Marlowe's Dr. Faustus, and Spenxer's Faerie Queen, and all these terms have been indexed. You may enter any combination of author and title terms and retrieve the work. The terms may be entered either in full or truncated form.

Examples: ƀ = blank

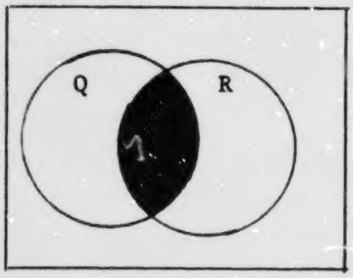
Y: ATK= SHAKESPEARE DR.
(The computer truncates this to SHAKDRƀƀ, and scores a hit for this work)
Y: ATK= SHAK DR
(The computer truncates this to SHAKDRƀƀ and scores a hit for this work)
y: ATK= MARLOWE FAERIE
(The computer truncates this to MARLFAER, and scores a hit for this work)
Y: ATK= MARL, FAER
(The computer truncates this to MARLFAER, and scores a hit for this work)
Y: ATK= SPENCER HAMLET
(The computer truncates this to SPENHAML, and scores a hit for this work)
Y: ATK= SPEN,HAML
(The computer truncates this to SPENHAML, and scores a hit for this work)

Logical OPERATORS. Logical operators provide other methods for combining author and title terms. This allows much more sophisticated searching, and many more complex terms. Logical operators are:

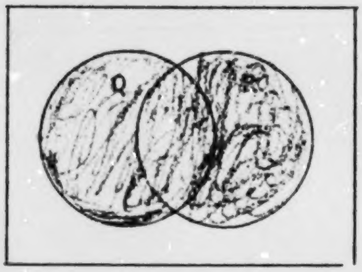
and, represented by the "*"
or, represented by the "+"
not, represented by "N"

The operators work via Boolean logic, as is shown in these Venn diagrams.

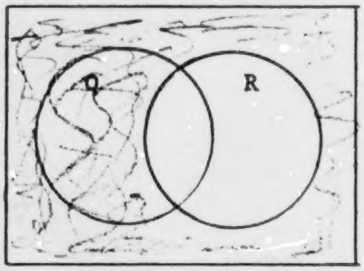
and *
Q and R



or +
Q or R



Not N
Not R



"and" searches the intersection of sets (terms) Q and R. Both need to be present for retrieval. "OR" searches the union of the sets (terms) Q and R. The presence of either term Q or R causes the computer to retrieve information. "Not" retrieves information where the set (term) R is not present.

Examples:

Y: A= SHAKESPEARE, WILLIAM * T= HAMLET

This retrieves all entries where the author is Shakespeare, and the title is Hamlet. Both terms MUST be present for retrieval.

Y: A= SHAKESPEARE, WILLIAM + T= HAMLET

In this case, the presence of either the author or the title will retrieve the entry.

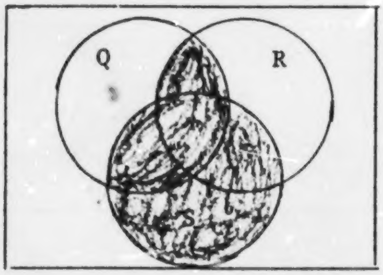
Y: A= SHAKESPEARE, HAMLET N T= HAMLET

This will retrieve all entries with Shakespeare as author, except Hamlet. The logical combinations operate according to a priority: "and" (*) overrides "or" (+) and "not (N); "or" (+) overrides "not" (N).

Example:

Y: T= HANDBOOK OF DATA PROCESSING FOR LIBRARIES +
       A= BECKER, JOSEPH * A= HAYES, ROBERT.

In this case, "and" (*) takes precedence over "or" (+). The title, or BOTH authors' names, Becker and Hayes must be present for the record to be retrieved

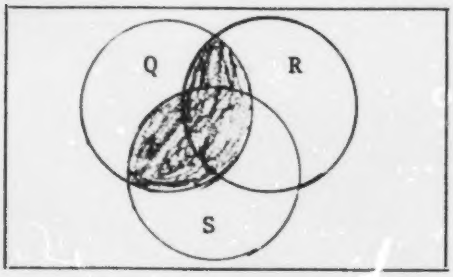


Q - A= Becker, Joseph
R - A= Hayes, Robert
S - T= Handbook of DP for Libs

A method to override this order is to use parentheses. These function as they do in algebra: any operation within the parentheses has priority over the others. This allows you to arrange and rearrange combinations in plentiful and powerful ways.

Example:

Y: T= HUCKLEBERRY FINN * (A= CLEMENS, SAMUEL LANGHORN + A= TWAIN, MARK)



Q - T= HUCKLEBERRY FINN
R - A= CLEMENS, SAMUEL
S - A= TWAIN, MARK

This operation retrieves all entries for which HUCKLEBERRY FINN is the title, and either CLEMENS or TWAIN is the author. The ability to ask for such combinations allows you to choose many or all forms of the author's name, and forms of titles as well (ex: T= THE ADVENTURES OF HUCKLEBERRY FINN + T= HUCKLEBERRY FINN) You may also use truncated forms of author key, title keys, and author-title keys as explained in Section 3.2.

Example:

T+ ALI,IN,W * A= CARR, LEW + A= DODG,CHA,L

The GO Command. After entering each request in batch searching, you must enter the GO command. This command positions the REQUEST processor at the first available search number in the file to allow a new request to be entered. Your entries then have the form: request GO request GO request SEARCH.

Editing commands. Before leaving REQUEST (see Section 3.6) you might want to review and edit any of your requests. For any search request (One Screen) you may enter up to 10 lines of text (77 characters each) containing the search string. For most requests, one line will suffice. The search string is entered, a line at a time, on the bottom "Command Line" of the screen. If you wish to edit (add or delete parts of the request) use the following commands:

text or I text	- Add a line of text to the string. Note that if the text begins with a number or the letter I, followed by a blank, or could be interpreted as any other valid command, the second form shown must be used.
num text	- Replace line "num" with the text following.
num	- Delete line "num" and compress upwards lines following it
I num text	- Insert a line of text before line "num".

Leaving the REQUEST Processor. The following commands provide exit from the REQUEST Processor:

SEARCH	Provides entry to the SEARCH processor. Sends the completed file of search requests to the remote computer. Waits for receipt of the display file of "hits" to the request, then goes automatically to the DISPLAY processor. Note: If the Level 6 is not connected to the 360-91, you must connect it by pressing the RING button and holding it until the red CONNECTED light goes on. The RING button is in the cream colored box on top of the Level 6.
DISPLAY	Displays the hits from the previous search.
CHANGE	Sends the CHANGE file containing changes to hits of a previous search. Note: If the Level 6 is not connected to the 360-91, you must connect it by pressing the RING button and holding it in until the red CONNECTED light goes on. The RING button is in the cream colored box on top of the Level 6.
WAIT	Indicates you wish to wait for the transmission in progress, usually invoked after a SEARCH and CHANGE.
END	Ends the current session and returns to the selector. (The selector causes the CRT to display the message: ENTER THE NAME OF THE FUNCTION YOU DESIRE).

Sample Example -- Batch. In this method of operation, you can input an entire set of requests which can then be searched for as a batch or group.

```
C:   ENTER THE NAME OF THE FUNCTION YOU DESIRE
Y:   REQUEST
DE*  (Clears out the file)
A  = SHAKESPEARE, William, 1564-1616 (Assigns search string)
GO   (Locates NEXT free entry)
T  = DEATH VALLEY
GO
L  = 68 - 12577
GO
R  = 8237418
GO
AK = BURR, EDG, R
GO
ATK= NEED, ORGA
GO
TK = INFO, RE, IN, T
GO
G  = 52
SEARCH                                  (You have left REQUEST, and have entered
                                         the SEARCH Processor.  IF the Level 6
                                         is not connected to the 360-91, you must
                                         press the RING button.)
```

Sample Example One-at-a-time. In this method of operation, you can input a single request (at a time) and have a search made for it alone.

```
C:   ENTER THE NAME OF THE FUNCTION YOU DESIRE
Y:   REQUEST
DE*  (Clears out the file)
A  = Shakespeare, William, 1564-1616 (Assigns search string)
SEARCH                                  (You have left REQUEST, and have entered
                                         the SEARCH Processor.  IF the Level 6 is
                                         not connected to the 360-91, you must press
                                         the RING button.)
```

4. THE SEARCH PROCESSOR. Upon involving SEARCH, the CRT displays the message: DO YOU WISH TO WAIT? Please enter "Y" for "Yes". This invokes WAIT, and you must wait until transmission of data to the 360-91, processing, and results are sent back to the Level 6 before you may proceed. See Appendix I for more information on WAIT.

During SEARCH (Batch) processing, a TSO (Time Sharing Option) session is established. The Level 6 transmits the REQUEST file (via TSD) to the remote computer. The 360-91 sends back a DISPLAY file, the output of the SEARCH program. Upon normal completion, the user is automatically transferred to the DISPLAY Processor.

5. THE DISPLAY PROCESSOR. Entry to the DISPLAY processor is normally automatic (See Appendix I for an explanation of WAIT). Each time it is entered, the CRT displays a summary screen showing the contents of the DISPLAY file. This takes the form of the DISPLAY number (the same as for Request) followed by the SEARCH results: number of hits, or error messages, etc. (See the Examples which follow.) The commands used in the DISPLAY Processor are basically the same as those in the REQUEST Processor:

SU - summarizes the contents of the file. Note that this is invoked automatically upon entering DISPLAY.

GO   - views hits sequentially or specifically.

The GO Command. GO is used to view hits. Upon entering DISPLAY, you view the summary screen, to see a summary screen for any specific search, enter GO num, where "num" is the number of the search. If you wish to view all the searchs with their summary screens sequentially, you begin by using GO, entering GO to view hits (and add any changes). If you wish to view them in any other order, enter GO num to view the search's summary screen, then GO to view the hits sequentially. To view the hits of a specific search in a different order (nonsequentially) enter GO num, num: where the first "num" is the search number, and the second is the hit number.

EXAMPLES: REVISION S

```
C = the following search requests are available for display viewing:

SEARCH          MESSAGE
NUMBER   HITS   SEARCH    ______   ____   ______

1.  Plato -- 2 entries                  3.  68-12579 - 3 entries
2.  LAS, OF, TH, M -- No for this request

COMMAND:

Y = GO

C = the following hits are available for viewing;

______   ________   ______   ________   ________   _______

1.  PLATO
2.  PLATO
                        List of Postings

Y = GO

C = the following hits are available for viewing:

Search no 0001     Search     Hit no 00018 of 0009

PLATO

    _ _ _ _ _
      _ _ _
      _ _ _
    _ _ _ _ _ _
COMMAND:
Y =          Main entry = Socrates.
```

Y = GO
C = the following hits are available for viewing

PLATO
FICHE ___ ___ ___

COMMAND:

Viewing hits. Hits may appear online or on the fiche with or without changes online. If the hit is online,the CRT will display the bibliographic entry and associated changes. If the hit is on fiche, the CRT screen shows the fiche location, while the Level 6 brings up the correct fiche on the fiche reader. Any associated changes will appear online on the CRT screen.

Entering changes. Changes are entered online, and may take any form.

EXAMPLES:
Y = Delete full entry
Y = Main entry changed to TWAIN, MARK
Y = Add: illustrated by John Tenniel
Y = Main entry birth date, 1920.

In order to effect changes, invoke the CHANGE processor (enter CHANGE) It's best to wait until you have completed viewing all the hits and entering all the changes.

The contents of the DISPLAY file are maintained

Leaving the DISPLAY Processor. Although any of the commands may be used to exit from the DISPLAY Processor, you usually leave by invoking CHANGE.

CHANGE	send the CHANGE file containing changes to hits of a search and then returns to the selector. (The selector causes the CRT to display the message: ENTER THE NAME OF THE FUNCTION YOU DESIRE).

```
              *** UCLA/GSLIS CARD SYSTEM - DISPLAY ***
SEARCH NO. 0001  R=8023049+8023174+9010742+902577          HIT NO. 0000 OF 0005
R=8031216:   1 POSTING
R=9025777:   1 POSTING
R=9010742:   1 POSTING
R=8023174:   1 POSTING
R=8023049:   1 POSTING
```

```
---------------- NEW CHANGES TO BE APPLIED TO THE ABOVE ENTRY ---------------

COMMAND?
```

```
              *** UCLA/GSLIS CARD SYSTEM - DISPLAY ***
SEARCH NO. 0001  R=8023049+8023174+9010742+902577          HIT NO. 0001 OF 0005
01                A27  8023049       732
02 090 HC103.M678:mMultiple Copies
03 100 Mouzon, Olin T.
04 245 Resources and industries of the United States.
05 260 New York,$bAppleton-Century-Crofts$c1966.
06 300 486p. illus.
07 504 Includes bibliography.
08 650 Industrial organization.
09 650 United States$xEconomic conditions.
```

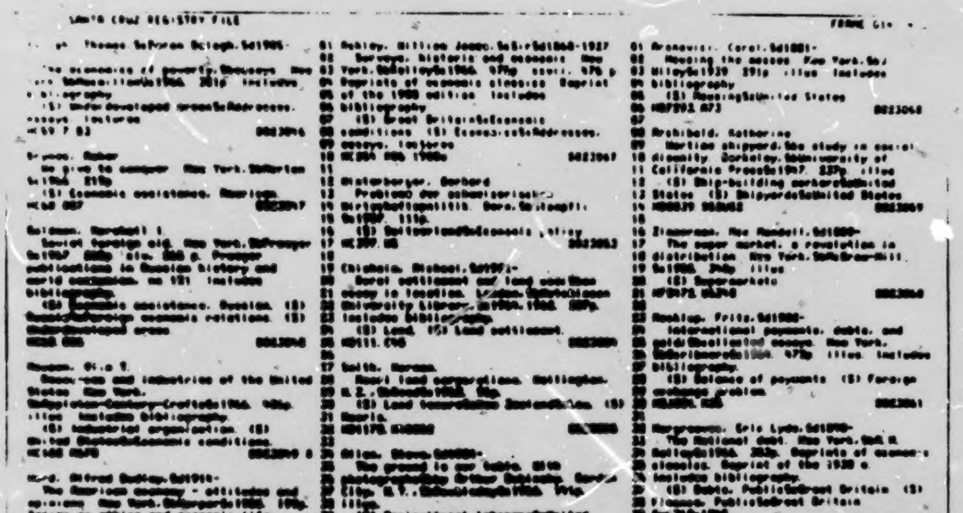
```
---------------- NEW CHANGES TO BE APPLIED TO THE ABOVE ENTRY ---------------

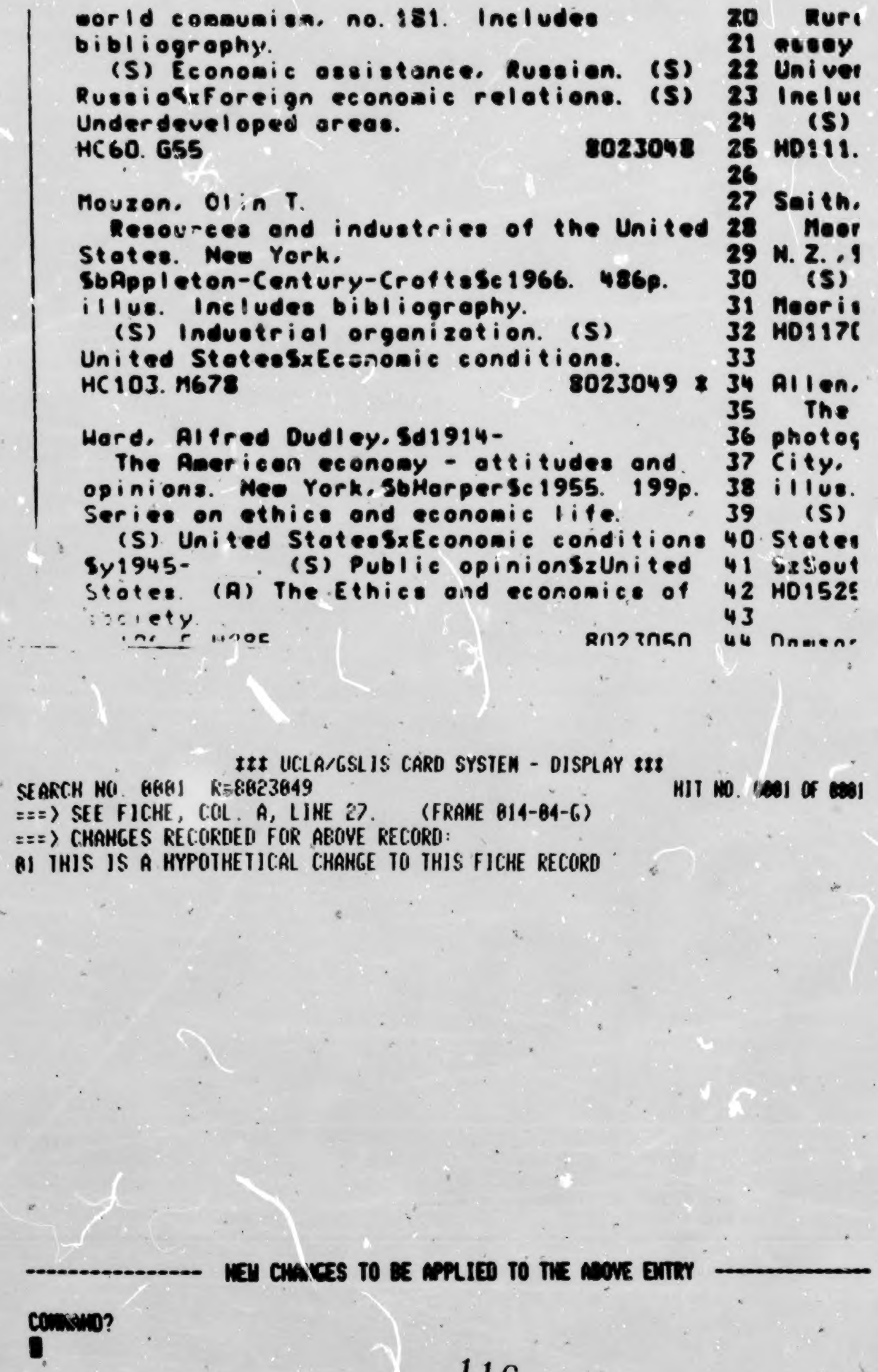
COMMAND?
```

```
                  *** UCLA/GSLIS CARD SYSTEM - DISPLAY ***
SEARCH NO. 0001  R=8023049+8023174+9010742+902577           HIT NO. 0001 OF 0005
===> SEE FICHE, COL. A, LINE 27.    (FRAME 014-04-G)




---------------- NEW CHANGES TO BE APPLIED TO THE ABOVE ENTRY ----------------
THIS IS A HYPOTHETICAL CHANGE TO THIS FICHE RECORD
COMMAND?
█
```





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world communism, no. 181.  Includes        20   Rur
bibliography.                              21 essay
  (S) Economic assistance, Russian.  (S)   22 Univer
Russia$xForeign economic relations.  (S)   23 Inclu
Underdeveloped areas.                      24   (S)
HC60.G55                        8023048    25 HD111.
                                           26
Mouzon, Olin T.                            27 Smith,
  Resources and industries of the United   28   Maor
States.  New York,                         29 N.Z.,1
$bAppleton-Century-Crofts$c1966.  486p.    30   (S)
illus.  Includes bibliography.             31 Maoris
  (S) Industrial organization.  (S)        32 HD1170
United States$xEconomic conditions.        33
HC103.M678                      8023049 *  34 Allen,
                                           35   The
Ward, Alfred Dudley,$d1914-     .          36 photog
  The American economy - attitudes and     37 City,
opinions.  New York,$bHarper$c1955.  199p. 38 illus.
Series on ethics and economic life.        39   (S)
  (S) United States$xEconomic conditions   40 States
$y1945-     .  (S) Public opinion$zUnited  41 $zSout
States.  (A) The Ethics and economics of   42 HD152
society.                                   43
                                8023050    44


                 *** UCLA/GSLIS CARD SYSTEM - DISPLAY ***
SEARCH NO. 0001  R=8023049                            HIT NO. 0001 OF 0001
===> SEE FICHE, COL. A, LINE 27.    (FRAME 014-04-G)
===> CHANGES RECORDED FOR ABOVE RECORD:
01 THIS IS A HYPOTHETICAL CHANGE TO THIS FICHE RECORD




---------------- NEW CHANGES TO BE APPLIED TO THE ABOVE ENTRY ----------------

COMMAND?
█
```

END	Exits the DISPLAY Processor and returns to the selector. (The selector causes the CRT to display the message: ENTER THE NAME OF THE FUNCTION YOU DESIRE).

REQUEST and SEARCH are not usually used when exiting the DISPLAY Processor. Invoking SEARCH will destroy any changes made.

6. THE CHANGE PROCESSOR. The CHANGE Processor is normally invoked after entering all new changes to any bibliographic entries in the DISPLAY Processor and then entering the CHANGE command. At this point, the file of all changes to the TSO SEARCH program for application to the data base. Be sure to press the Ring button if the Level 6 is not connected to the 360-91. After transmission, the CHANGE file is cleared, and you are returned to the selector.

7. ERROR MESSAGES

1. MESSAGE TEXT: TSD ERROR
   LOCATION: CDSELE
   EXPLANATION: An error has occurred during the connection to the remote connection to the remote computer. Very likely it is not currently operating.
   OPERATOR RESPONSE: Reboot the system later when the remote computer is available.
   PROGRAMMER RESPONSE: None

2. MESSAGE TEST: ERROR IN OR WITH ACCESS FILE
   LOCATION: CDSELE
   EXPLANATION: The computer cannot load (store in its memory) information.
   OPERATOR RESPONSE: Check to make sure data diskettes are the correct ones, and in the proper handlers.
   PROGRAMMER RESPONSE: Verify that LIB:CDACCESS exists on the CRDSYS diskette.

ERROR MESSAGES - continued

3. MESSAGE TEXT: INVALID USER NAME
   LOCATION: CDSELE
   EXPLANATION: The name you have entered is not one that allows access to the files.
   OPERATOR RESPONSE: Enter a valid user name. If you will be using the system regularly, arrange to have your name entered as a valid user name.
   PROGRAMMER RESPONSE: NONE

4. MESSAGE TEXT: Mount Proper Data Diskette - XXXXXX
   LOCATION: CDSELE
   EXPLANATION: This is not a true error message, but a direction to take this action at the appropriate time.
   OPERATOR RESPONSE: Locate and mount the data diskette - XXXXXX
   PROGRAMMER RESPONSE: NONE

5. MESSAGE TEXT: FICHE FILE OPEN FAILED
   LOCATION: CDSELE
   EXPLANATION: For some reason, access to the microfiche files is blocked.
   OPERATOR RESPONSE: Reboot the system. Notify a programmer.
   PROGRAMMER RESPONSE: Using the debugger, identify the open return code.

6. MESSAGE TEXT: Unable to locate the Data File(s)
   LOCATION: CDSELE
   EXPLANATION: The file(s) associated with your user name are inaccessable.
   OPERATOR RESPONSE: Enter the correct user name, or mount the data diskette with the files you need.
   PROGRAMMER RESPONSE: NONE

7. MESSAGE TEXT: Invalid Function Name
   LOCATION: CDSELE
   EXPLANATION: The function name you entered is not one that is allowed.
   OPERATOR RESPONSE: Enter the name, or the truncated form of the name:

      REQUEST
      DISPLAY
      SEARCH
      CHANGE
      WAIT
      END

   PROGRAMMER RESPONSE: NONE

ERROR MESSAGES - continued

8. MESSAGE TEXT: Syntax Error
   LOCATION: CDREQU
   EXPLANATION: The command you have entered has been identified but its syntax is inconsistent or the operation to be performed is meaningless.
   OPERATOR RESPONSE: Correct the format of the command or enter a new command.
   PROGRAMMER RESPONSE: NONE

9. MESSAGE TEXT: INVALID SEARCH NUMBER
   LOCATION: CDREQU
   EXPLANATION: The search number to which the last command refers is outside the range of the file and does not exist.
   OPERATOR RESPONSE: Modify the search number to stay within the file's extent.
   PROGRAMMER RESPONSE: NONE

10. MESSAGE TEXT: Syntax Error
    LOCATION: CDDISP
    EXPLANATION: The command you have entered has been identified but its syntax is inconsistent or the operation to be performed is meaningless.
    OPERATOR RESPONSE: Correct the format of the command or enter a new command.
    PROGRAMMER RESPONSE: NONE

11. MESSAGE TEXT: INVALID SEARCH NUMBER
    LOCATION: CDDISP
    EXPLANATION: The search number to which the last command refers is outside the range of the file and does not exist.
    OPERATOR RESPONSE: Modify the search number to stay within the file's extent.

12. MESSAGE TEXT: E000
    LOCATION: Halt code in D1
    EXPLANATION: A fatal system error has occurred.
    OPERATOR RESPONSE: Notify a programmer immediately.
    PROGRAMMER RESPONSE: Selector missing from XFER table.

ERROR MESSAGES - continued

13. MESSAGE TEXT: E001
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: Overlay error. Return code from ZXOVLY is in R2.

14. MESSAGE TEXT: E002
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: DISPLAY I/O error. R2 = CODE. B4 = IORB. Press Execute to continue.

15. MESSAGE TEXT: E100
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: CDDATA FORMAT IN CDSELE ASSEMBLY DOES NOT MATCH THAT OF CDROOT. REASSEMBLY MAY BE REQUIRED.

16. MESSAGE TEXT: E200
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: CDDATA FORMAT IN CDSELE ASSEMBLY DOES NOT MATCH THAT OF CDROOT. REASSEMBLY MAY BE REQUIRED.

17. MESSAGE TEXT: E201
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: Module missing from XFER table.

ERROR MESSAGES - continued

18. MESSAGE TEXT: E202
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: Logic error.

19. MESSAGE TEXT: E203
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: I/O error RC = R2

20. MESSAGE TEXT: E300
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: CDDATA FROMAT IN CDSELE ASSEMBLY DOES NOT MATCH THAT OF CDROOT. REASSEMBLY MAY BE REQUIRED.

21. MESSAGE TEXT: E301
LOCATION: Halt code in D1
EXPLANATION: A fatal system error has occurred.
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: Module missing from XFER table.

22. MESSAGE TEXT: E302
LOCATION: Halt code in D1
EXPLANATION: TSD ERROR
OPERATOR RESPONSE: Notify a programmer immediately.
PROGRAMMER RESPONSE: Logic Error

23. MESSAGE TEXT: QUERY CONTAINS AN IMPROPER SEQUENCE OF ELEMENTS
LOCATION:
EXPLANATION: Certain elements may not follow one another in a search request. EX: ( ) or * +.
OPERATOR REXPONSE: Re-enter the query (SEARCH REQUEST) with a proper order of elements. Check for logical erros and typographical errors.
PROGRAMMER RESPONSE: NONE

ERROR MESSAGES - continued

24. MESSAGE TEXT: QUERY CONTAINS TOO MANY ELEMENTS
    LOCATION:
    EXPLANATION: Queries (search requests) are allowed 30 elements, including qualifiers (A=), search argument (SHAKESPEARE, William), and logical operators (*).
    OPERATOR RESPONSE: Rephrase the search request so it contains 30 or fewer elements.
    PROGRAMMER RESPONSE: NONE

25. MESSAGE TEXT: QUERY CONTAINS A SEARCH ARGUMENT NOT QUALIFIED BY A QUALIFIER.
    LOCATION:
    EXPLANATION: Qualifiers, such as A=, AK=, T=, TK=, ATK=, G=, L=, R=, must be present in the search requests.
    OPERATOR RESPONSE: Re-enter the search request using the proper qualifier.
    PROGRAMMER RESPONSE: NONE

26. MESSAGE TEXT: A QUALIFIER IN THE QUERY OCCURS WITHIN THE SCOPE OF ANOTHER QUALIFIER.
    LOCATION:
    EXPLANATION: Pay no attention. This error message is invalid.
    OPERATOR RESPONSE: Re-enter your search request as it stands.
    PROGRAMMER RESPONSE: NONE

27. MESSAGE TEXT: Query contains an INVALID QUALIFIER
    LOCATION:
    EXPLANATION: Valid qualifiers are A=, AK=, T=, TK=, ATK=, R=, L=, G=, Others (such as SK=) are invalid.
    OPERATOR RESPONSE: Re-enter your request using a proper qualifier.
    PROGRAMMER RESPONSE: NONE

ERROR MESSAGES - continued

28. MESSAGE TEXT: QUERY CONTAINS UNBALANCED PARENTHESES
    LOCATION:
    EXPLANATION: Query has a right) and no left (parenthesis or has a left (and no right) parenthesis.
    OPERATOR RESPONSE: Re-enter your query, being sure it contains a right parenthesis) for every left (.
    PROGRAMMER RESPONSE: NONE

29. MESSAGE TEXT: QUERY CONTAINS NO QUALIFIER OR SEARCH ARGUMENT
    LOCATION:
    EXPLANATION: The query has no qualifier (A=, AK=, T=, TK=, ATK=, G=, L=, R=) and also has no arguments-author names, truncated author names, titles, truncated titles, author-title keys, GSLIS numbers, LC numbers, Santa Cruz Registry numbers.
    OPERATOR RESPONSE: Reform your search request so it has qualifiers followed by arguments. Use logical operators where appropriate.
    PROGRAMMER RESPONSE: NONE.

THE USE OF AN ON-LINE MICROFICHE CATALOG FOR TECHNICAL SERVICE AND RETRIEVAL OF BIBLIOGRAPHIC DATA

Section IV. Computer Programs

***

1 April 1979

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1. Introduction and Summary

The GSLIS experiments and demonstrations on the use of on-line microfiche are based on a set of equipment and associated set of computer programs. In this section of the Final Report, we present a description of the programs. Copies of them are available, upon request, at the cost of reproduction.

The Equipment

First, we should again summarize the configuration of equipment involved. The following schematic shows the main components. They are as follows:

(1) The central campus computer. At present, this is an IBM 360/91, with 4 megabytes of internal memory, extensive peripheral equipment, and a full array of operational software. This configuration is scheduled to be replaced this year by an IBM 3033, but the software developed for this project will be completely transferable.

(2) The GSLIS minicomputer. This is a Honeywell Level 6 with 80 kilobytes of internal memory and two diskette units, each with capacity for 250 kilobytes.

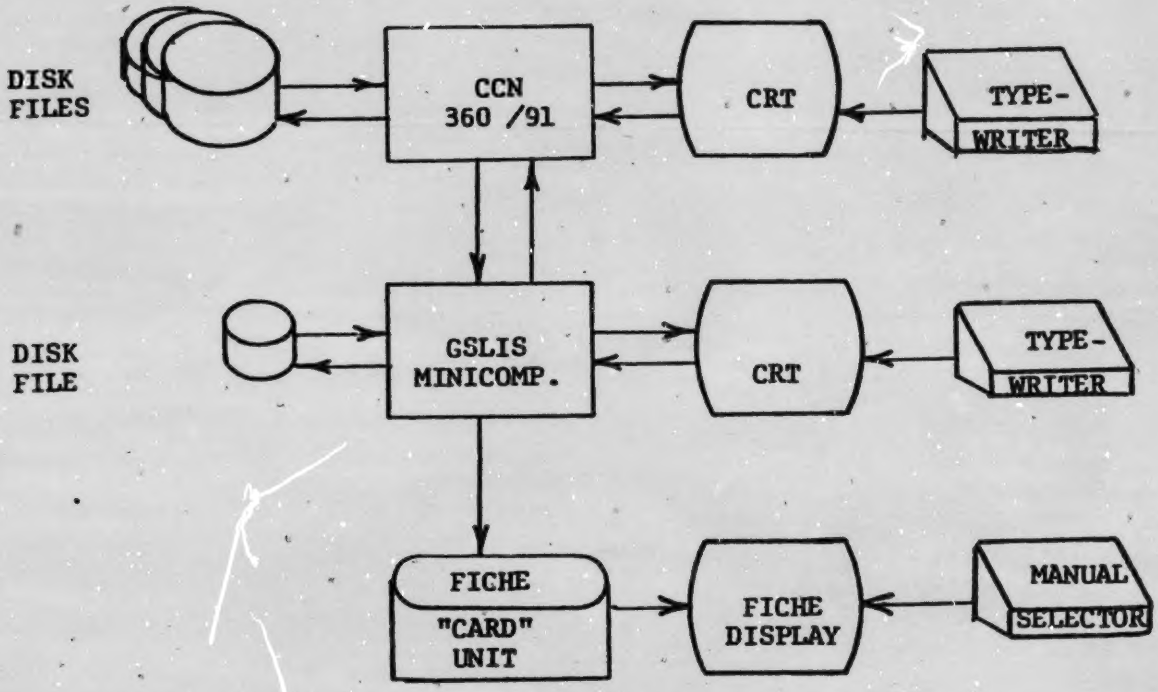
(3) Terminals. One terminal is directly connected to the central campus facility. It serves as a means for dealing with the programs operational on that facility, as well as for monitoring the operation of them. Two CRT terminals are directly connected to the GSLIS minicomputer; one is the operational CRT, used by the GSLIS CARD system; the other is used to monitor the communication between the GSLIS minicomputer and the central campus facility. Two typewriter terminals are also attached to the GSLIS minicomputer, but at this stage are only peripherally involved.

(4) The microfiche unit. This unit is an Image Systems, Inc., COMPUCARD unit, storing up to 750 fiche. For the experiments and demonstrations, however, it stores only 107 fiche, since that's all needed to hold the complete registry file catalog of the University of California, at Santa Cruz, the data base utilized for that purpose.

(5) Manual microfiche viewer. In order to demonstrate and experiment with manual access to the microfiche, a manual viewer and a duplicate copy (107 fiche) of the UCSC Registry File is included. (In fiche-mode operation, the CRT display of hits shows the fiche

FIGURE I

SYSTEM SCHEMATIC



number and frame location, so that a manual operation is easy even though time consuming.)

(6) The direct connection modem. A modem providing direct connection between the central campus facility and the GSLIS minicomputer is included. It functions at 2400 baud. Connection is effected when the "ring" button is pushed.

(7) The telephone connection modem. A modem providing for telephone connection to any external computer, including the central campus facility, is part of the array of equipment. It functions at 300 baud. Connection is effected by dial-up.

(8) The GSLIS microcomputer. A Radio Shack TRS-80 is included and is being programmed to perform many of the functions now operational on the Honeywell Level 6.

The Programs

In this section of the Report, we provide details of the programs in five categories. The following schematic shows the inter-relationships among the major components.

(1) The CARD system. This set of programs was written in Assembly Language for the Honeywell Level 6. It provides for the full range of capabilities for input of data (requests), display of hits control of the fiche (CARD) unit, input of changes to stored data, and general control of the operations of the minicomputer.

(2) The CNCT program. This program is an application program, written in Assembly Language for the Honeywell Level 6. It causes the Level 6 to act as an intelligent ASCII terminal with file transfer capabilities. While it serves more general purposes, it specifically serves as means for data transfer to and from an asynchrous communication line.

(3) The Asynchronous Data Transmission Protocol. This program is now an integral part of the operating system of the central campus facility. While it was developed by them with the specific needs of this program as specifications, it serves more generally as the means for communication in the developing distributed computing system on campus.

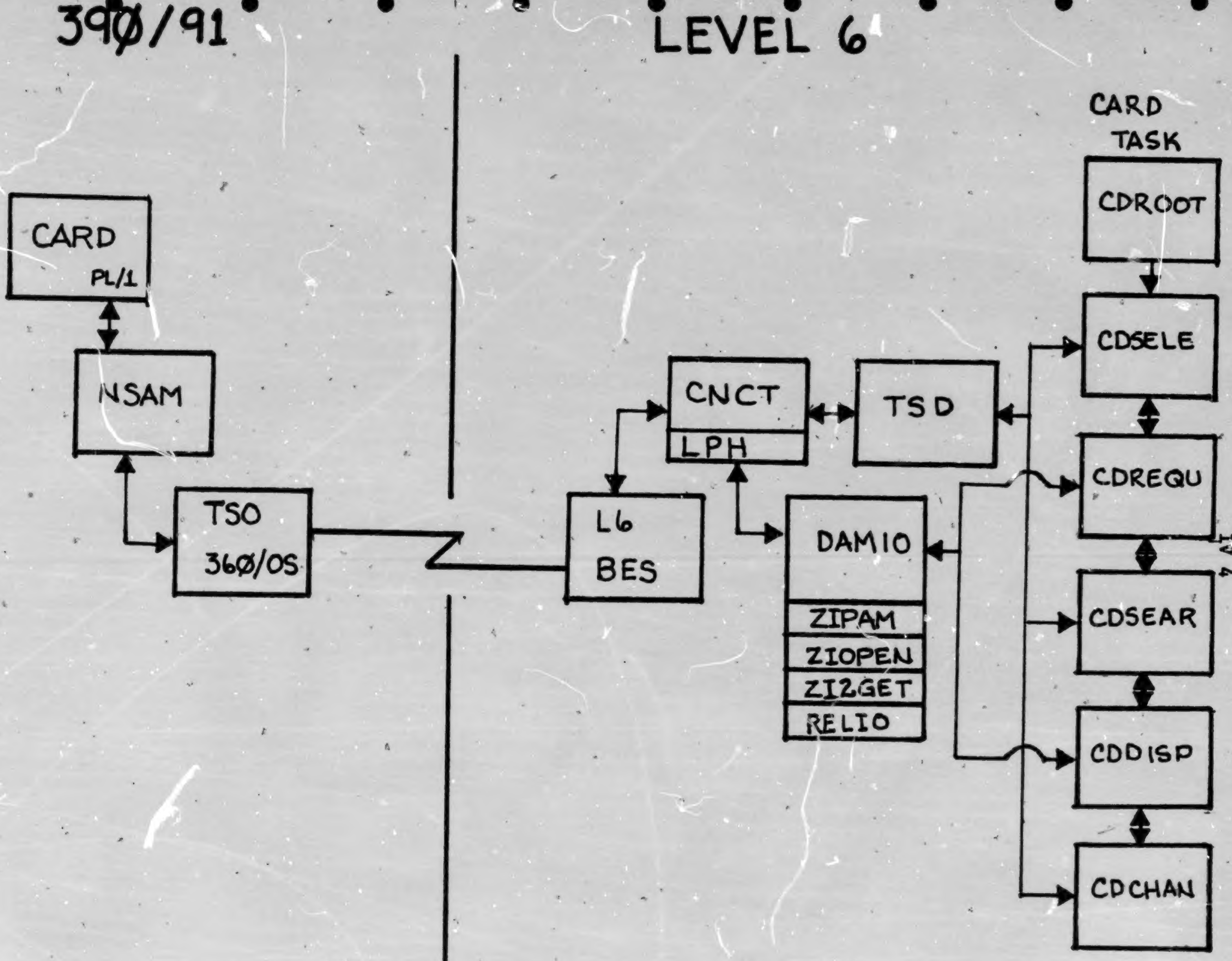


FIGURE 2. SOFTWARE SCHEMATIC

(4) Network Sequential Access Method. This program is also now an integral part of the operating system of the central campus facility. It provides the interface between application programs, operating under TSO, and the communication protocols described under "Asynchronous Data Transmission."

(5) Data Base Programs. These programs were written in PL/I to provide capability for creation of the several data bases involved (fiche, on-line digital, and indexes to both), for establishing and maintaining the on-line digital data bases and indexes, for search of them, and for set-up of experimental conditions.

2. GSLIS CARD System

In this sub-section, we define the external functionality of the GSLIS CARD project system as well as provide detailed design for the interactive program elements of the system. Interfaces to and data formats for communication with other program components, such as the data base search program on TSO and the communication Line Protocol Handlers, will also be discussed. It is intended that this document serve as a guide for the CARD program that was written for the Level 6.

System Overview

Interaction with the CARD system begins with the user identifying himself or herself. After this is done a series of search requests is normally entered. These requests are batched and stored in a diskette file. When all requests have been entered, the file is transmitted to TSO over an asynchronous ASCII line and it becomes the input to a bibliographic search program. For each request string, this program outputs a set of formatted displays corresponding to MARC format "bib" records found in an online data base. The file which is formed by the collection of the sets of displays for all input search strings is then transmitted back to the Level 6. When the display file has been received, the user is shown each display, either sequentially or by specific direction, and is asked to make changes in the data. These are batched and later transmitted back to the search program for storage. If a previously changed bib record is later located in a search it will be displayed with its changes. In addition, any bib record display can be replaced by a microfiche display which is automatically called up on the microfiche unit under the direction of the search program. A microfiche display may also have changes, stored in a data base accessible to the search program, which will appear on the CRT whenever that microfiche entry is the subject of a search. A diagram of the system is shown in Figure 3. Normally, unless rapid responses are required, the TSO search program (and, indeed, the TSO session itself) will only be activated when a file must be transferred, to allow most of the operation to occur offline from the central computer.

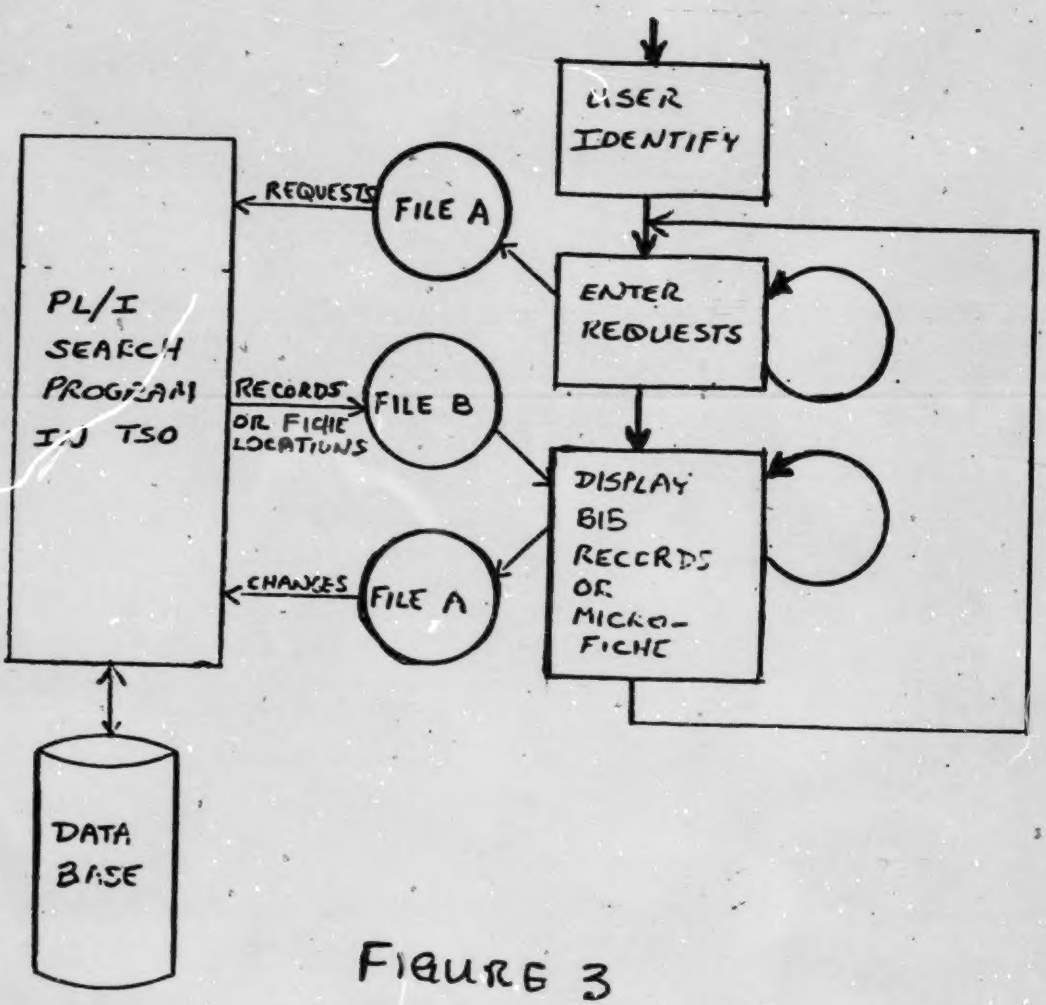

USER IDENTIFY
ENTER REQUESTS
DISPLAY BIS RECORDS OR MICRO-FICHE
FILE A
REQUESTS
FILE B
RECORDS OR FICHE LOCATIONS
FILE A
CHANGES
PL/I SEARCH PROGRAM IN TSO
DATA BASE

FIGURE 3

External Operation in Detail

The Selector. Upon booting the CARD system, the first screen which appears is that shown in screen diagram #1a. The responses required of the user are outlined below:

"PLEASE ENTER YOUR LAST NAME AT LEFT"

The user must enter his last name or a name to uniquely identify himself to the CARD system. After checking a list of valid users kept in a file on the CARD system diskette, the name is used to verify the mounting of the proper data diskette and form the names of and locate the internal CARD system files for the session on the data diskette.

"SHOULD A CONTINUOUS CONNECTION TO THE REMOTE COMPUTER BE MAINTAINED?"

If the response is 'YES' a TSO session is created and left "online", accruing connect charges, to provide the most rapid response to any communications requests. If 'NO' is the reply, the TSO session is created when needed and logged off after each use to minimize connect time charges.

Screen #16 now appears and the user should respond with the name of the desired function. Normally this would be 'REQUEST' if no provious searches were done or are of interest. Each function will be covered in detail next.

The Request Processor. The request processor is used to initially enter and/or later correct search requests prior to their being sent to the search program at the remote computer. Upon initial entry, if any old requests exist in the request file, these are summarized on a screen as shown on screen #2. At this point the user may clear the file so that no held over old requests exist by typing the DElete command or he may enter any other valid command as follows:

SU - Summarize current status of requests. Displays initial summary screen at any time while in the request processor.

DE num - Delete request whose search number is 'num' from the request file. If 'num' is omitted, the current request is deleted.

DE * - Delete all requests in the request file. This command is used to "start fresh" before entering a new set of requests.

GO num - Display, for update, request whose search number is 'num'. If 'num' is omitted the request processor positions itself to the first available search number in the file to allow a new request to be entered.

NOTE: Before the request processor advanced to another request entry, the newly entered (or changed) search string, if any, is written to the request file. This function also occurs for any of the above commands or any transfer command, if required.

In addition to the above commands which allow control of the request processor, the following commands may be used to exit to another processor:

SEARCH - Search. Send the completed file of search requests to the remote computer. Await receipt of the display file of "hits" to the given searches.

DISPLAY - Do not send request file yet. Display the hits from a previous search.

CHANGE - Do not send request file yet. Send change file containing changes made to hits from a previous search.

END - Do not send request file yet. End this session and return to the selector to allow another user to log in (without the need of re-booting the system).

When in the request processor and not viewing the summary screen, the user is shown a screen like screen #3. For any search request (one screen) he may enter up to 10 lines (77 characters each) containing the search criteria or search string. For most requests one line will suffice. The search strong is entered, a line at a time, on the bottom, "command line" of the screen using the following editing commands:

text
or
I text - Add a line of text to the string. Note that if the text begins with a number of the letter I, followed by a blank, or could be interpreted as any other valid command, the second form shown at left must be used.

num text - Replace line 'num' with the text following.

num - Delete line 'num' and compress any lines following it upwards.

Inum text - Insert a line of text before line 'num'.

Thus, a very simple example might be:

```
DE   *                    (Clear out file)

T = TOMORROW'S MATH       (Assigns search strong)

GO                        (Locates next free entry)

T + HISTORY OF CHINA * AK = FITZ HENR

GO

L = 62 - 16577

GO

T = HAMLET

GO

I 62 - 16577

SEARCH                    (note use of "I" to avoid ambiguity;
                           also note that this entry contains an error)
```

<u>The Search Processor</u>. Upon invocation, if the previous transmission (if any) has completed, screen 4a is diplayed. If the user wishes to await completion of the request(s) he signals 'YES' and control transfers to the DISPLAY processor automatically upon ending transmission. If 'NO' is entered, the user is returned to the selector where he should 'END' and re-identify himself to obtain access to another set of files (not in use for transmission) on the <u>same</u> diskette. If the request ends in error, screen 4b is displayed. Interruption (such as re-booting or powering off) during this function's processing will produce unpredictable results requiring the search function to be re-invoked from the beginning. During search processing, a TSO session is established, the request file is transmitted to the search program on TSO, and a display file, the output of the search program, is transmitted back to the minicomputer. The request file is truncated at the non-empty request entry but is not compressed prior to transmission. This is necessary to preserve the structure for later request processor editing. It is thus possible for empty entries to be transmitted but these do not result in search records returned to the display file.

The Display Processor. Each time the display processor is entered, a summary is displayed showing the contents of the display file (see section #5). The commands in the display processor are basically the same as those in the request processor. The GO command is used to review the hits of a search either sequentially or by specific search number and/or hit number. Commands available are:

SU - Summarize contents of file

GO num - Display 'num'th hit. If 'num' is omitted, display next hit.

'num' in the GO command has the form:

search number or search number, hit number

If the first form is used, a summary of the search is displayed.

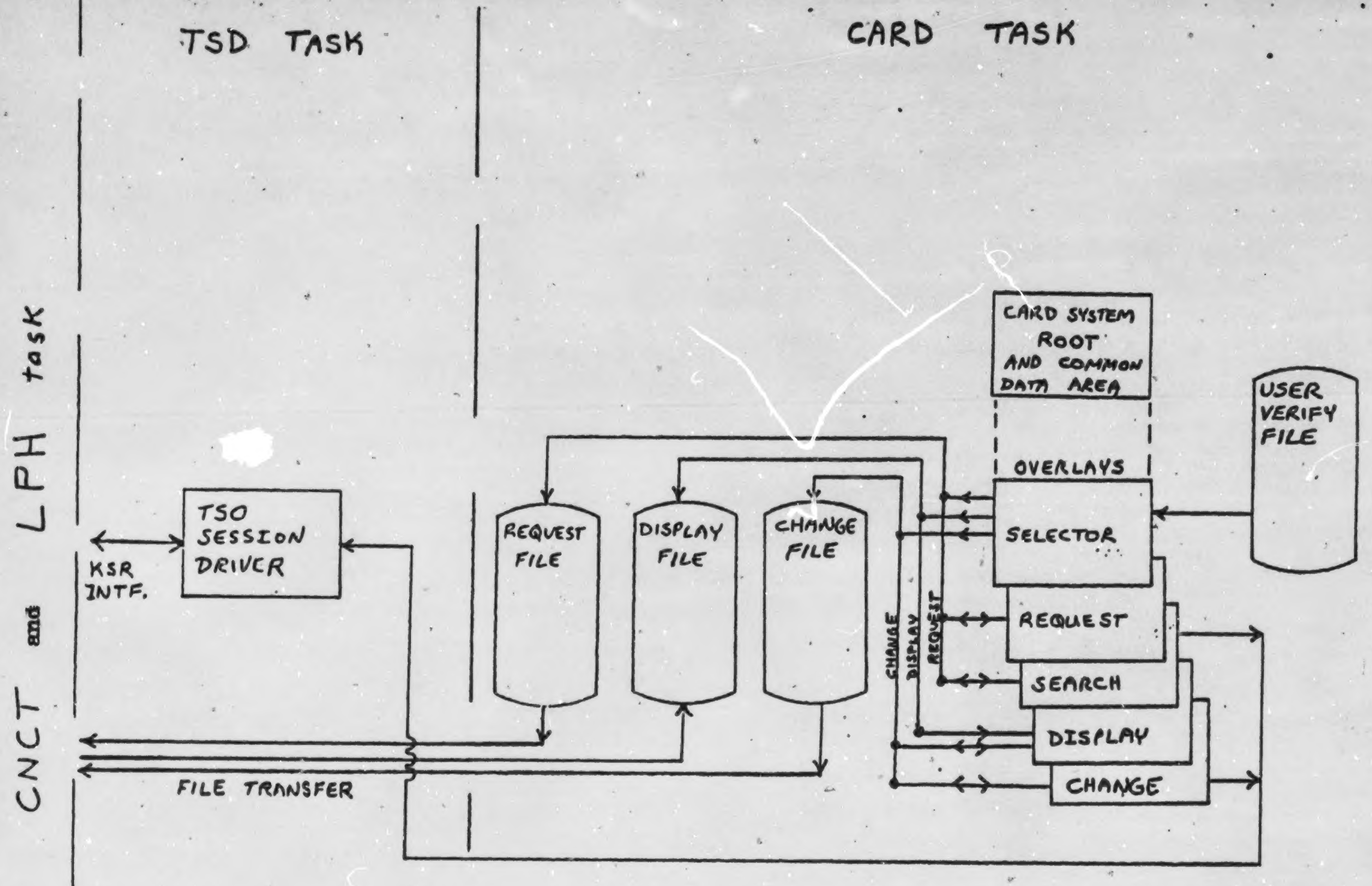
SEARCH, REQUEST, CHANGE AND END are also supported as described under the request processor. Each hit will cause the display of a screen such as screen #6 or screen #7. If the bib entry located was on-line, screen #6 appears with any previously applied changes. If a microfiche location contains entry, screen #7 appears, including previously applied changes, and the proper microfiche frame is displayed to the viewer. New changes may be entered and edited, as were search requests, using the same commands as those described in the request processor. The contents of the display file are maintained until the next SEARCH command is entered.

The Change Processor. The change processor is normally invoked after entering new changes to any bib entries in the display processor and then entering the CHANGE command. At this point, the file of all changes made to bib records is compressed and sent to the TSO search program for application to the data base. After transmission, the file is cleared and control transfers to the request processor.

Implementation.

Architecture of CARD system. The architecture of the CARD system is as shown in Figure 4. The overall system consists of three separate tasks: (1) the CARD task; (2) the TSO Session Driver task (TSD); and (3) the communications line handler task.

The communications task acts as an intelligent ASCII terminal connected to an TSO port on the remote computer. In addition, this task has the capability of transferring a local file over the communi-



CARD SYSTEM ARCHITECTURE

FIG. 4

FIGURE 5

USER FILE STRUCTURES

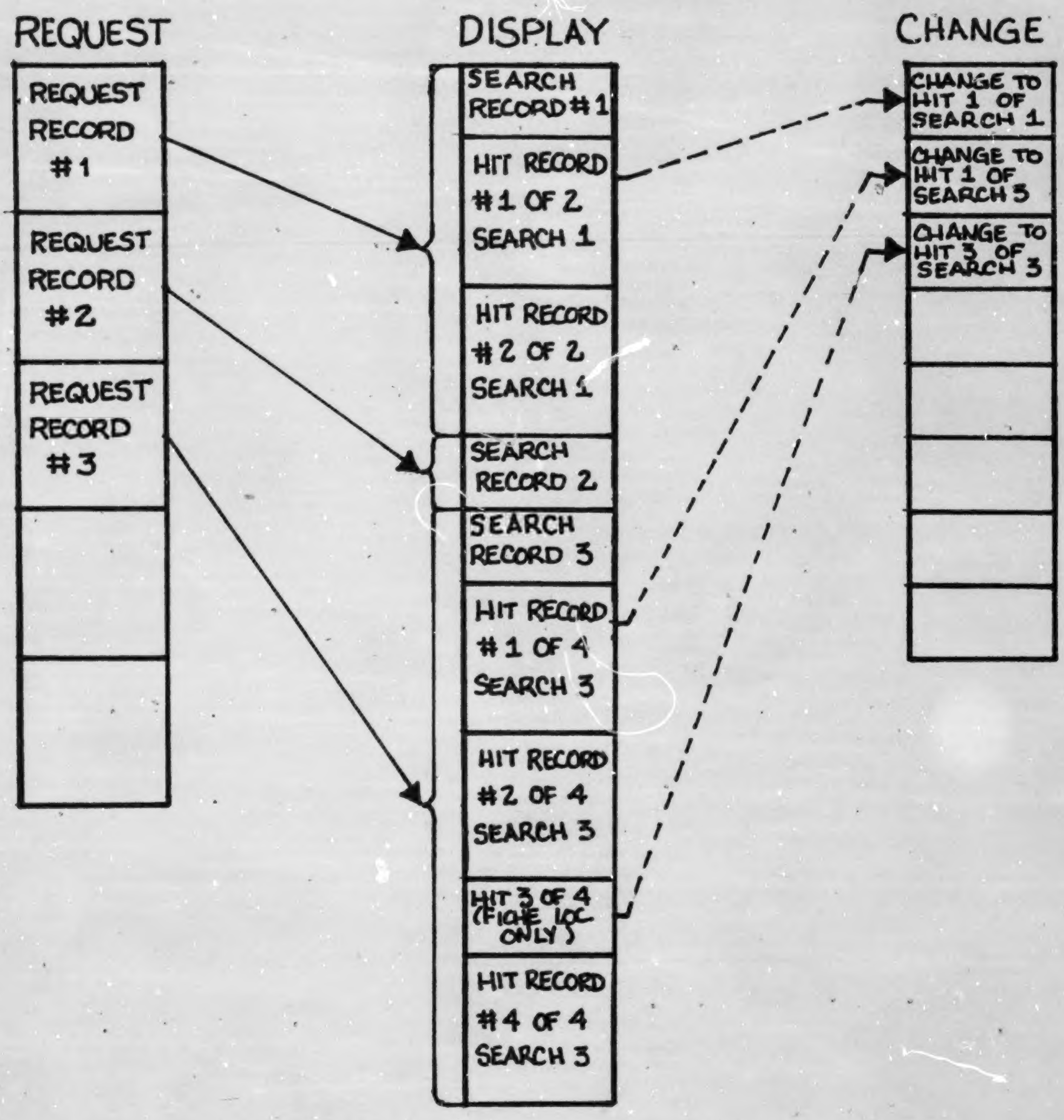
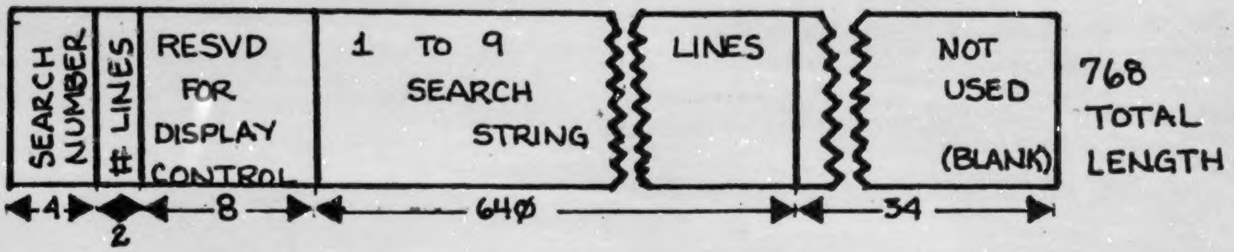
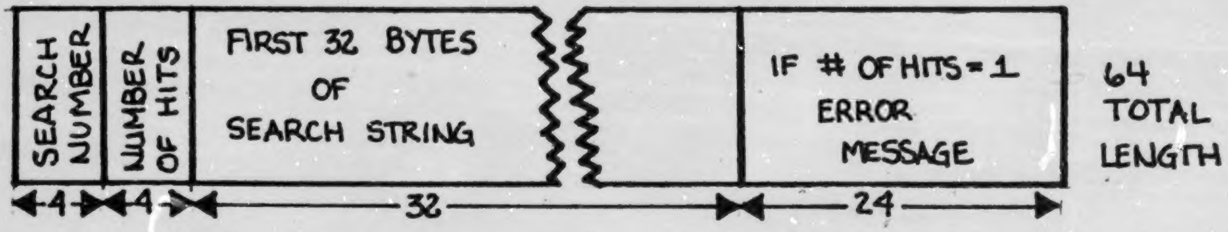

REQUEST
DISPLAY
CHANGE
REQUEST RECORD #1
REQUEST RECORD #2
REQUEST RECORD #3
SEARCH RECORD #1
HIT RECORD #1 OF 2 SEARCH 1
HIT RECORD #2 OF 2 SEARCH 1
SEARCH RECORD 2
SEARCH RECORD 3
HIT RECORD #1 OF 4 SEARCH 3
HIT RECORD #2 OF 4 SEARCH 3
HIT 3 OF 4 (FICHE LOC ONLY)
HIT RECORD #4 OF 4 SEARCH 3
CHANGE TO HIT 1 OF SEARCH 1
CHANGE TO HIT 1 OF SEARCH 5
CHANGE TO HIT 3 OF SEARCH 3

FIGURE 6

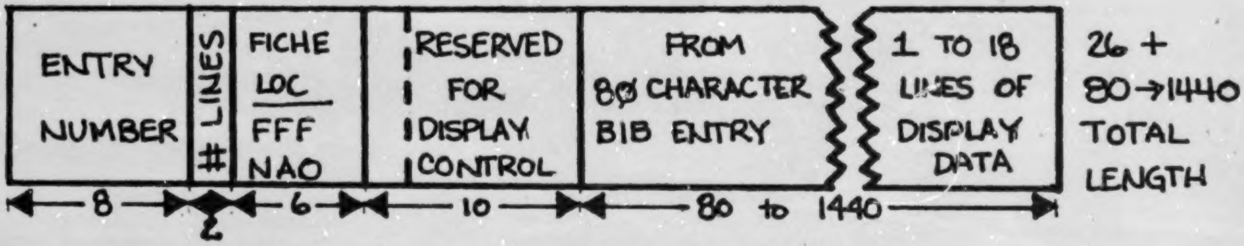
REQUEST RECORD



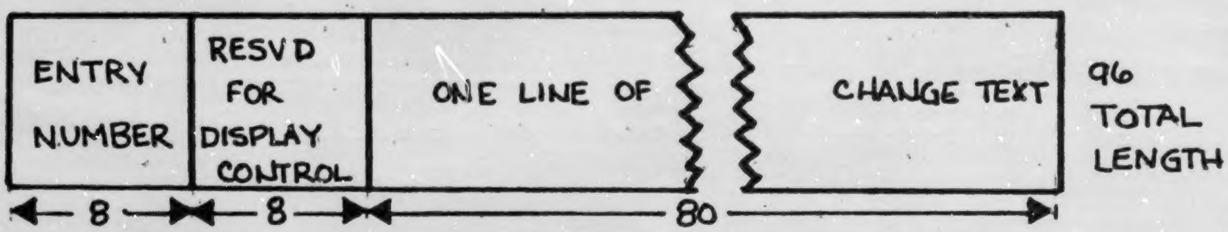
SEARCH RECORD


SEARCH NUMBER
NUMBER OF HITS
FIRST 32 BYTES OF SEARCH STRING
IF # OF HITS = 1 ERROR MESSAGE
64 TOTAL LENGTH
4
4
32
24

HIT RECORD


ENTRY NUMBER
# LINES
FICHE LOC
FFF NAO
RESERVED FOR DISPLAY CONTROL
FROM 80 CHARACTER BIB ENTRY
1 TO 18 LINES OF DISPLAY DATA
26 +
80→1440
TOTAL LENGTH
8
2
6
10
80 to 1440

CHANGE RECORD



ALL FIELDS ARE ALPHANUMERIC
ALL RESERVED FIELDS 000...

cation line to a file at the host computer or vice cersa in a rapid and reliable manner upon command of the TSO Session Driver.

The TSD plays the part of a computer controlled automation, running the TSO session through a KSR-like interface as if it were a user operating a terminal. Upon receiving a request from the SEARCH or CHANGE processors it invokes the appropriate TSO commands to perform the desired service and initiate file transfer. The TSD operates asynchronously from the CARD task for three reasons: to completely separate TSO dependent code from the more general part of the system in order to permit convenient coversion to the use of other remote timesharing systems; to allow some limited degree of overlap between communications functions and CARD system functions; and to provide immediate attention for unsolicited messages from the host computer, such as operator alerts, etc.

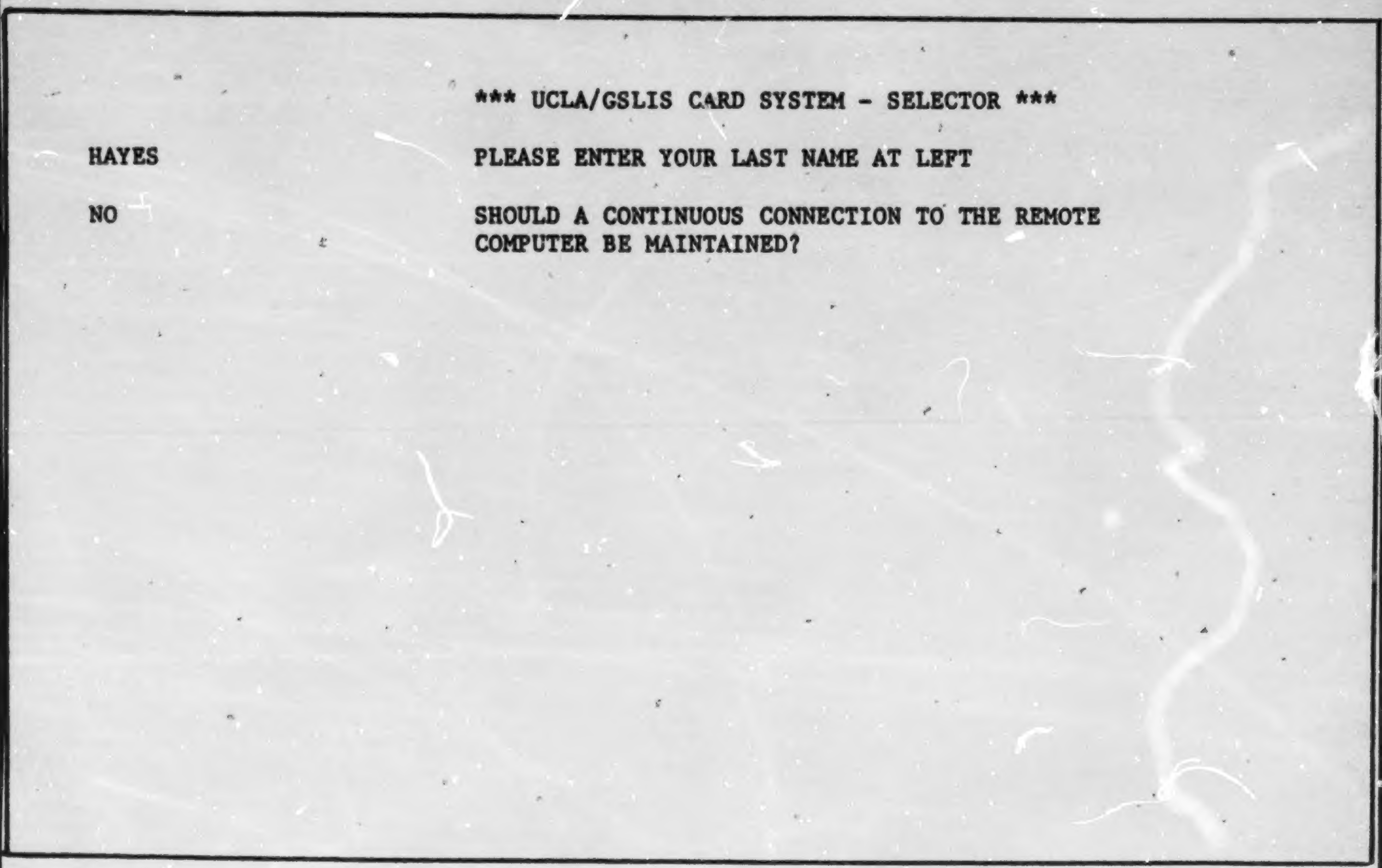
The CARD task itself operates as a series of overlays since each function is serial. Control of the CRT, fiche unit, and optional hardcopy device is solely the responsibility of the CARD task. Because of the complicated file structure brought about by space consideration, minimization of file transfer time, and very long records, the BES file manager is not used, but disk I/O is handled at the I/O Request Block level. This means the BED logical record boundaries can be ignored and no dead space occurs after a short record.

Short Term Implementation Goals. In order that development of the CARD system could proceed immediately, the first implementation used the CNCT program, as it exists for the level 6. This necessitated the use of the $MINI TSO command to send and receive files. A glance at the list of TSO and CNCT commands necessary to do this will show that a more efficient mechanism would be desireable:

```
LOGON user/password
SETUSE uselib
$MINI input-file READ
(cr)
(esc)Rrequest-file
END
ALLOC F(SYCIN) DA(input-file)
ALLOC F(SYSOUT) DA(output-file)
ALLOC F(database) DA(database)
CALL search-program
$MINI output-file WRITE
(esc)Wdisplay-file
(cr)
(esc)W
LOGOFF
```

APPENDIX A

SCREEN FORMATS



```
                          *** UCLA/GSLIS CARD SYSTEM - SELECTOR ***

HAYES                     PLEASE ENTER YOUR LAST NAME AT LEFT

NO                        SHOULD A CONTINUOUS CONNECTION TO THE REMOTE
                          COMPUTER BE MAINTAINED?
```

SCREEN # 1A

```
                         *** UCLA/GSLIS CARD SYSTEM - SELECTOR ***

REQUEST                  ENTER THE NAME OF THE FUNCTION YOU DESIRE
                         FUNCTIONS ARE:

                              REQUEST - ENTER SEARCH REQUESTS AND QUERIES
                              SEARCH  - TRANSMIT COMPLETED REQUESTS TO REMOTE
                                        COMPUTER AND AWAIT RESULTS
                              DISPLAY - DISPLAY HITS LOCATED BY PREVIOUS
                                        SEARCHES AND ALLOW CHANGES TO BE
                                        ENTERED
                              CHANGE  - SEND CHANGES TO REMOTE COMPUTER FOR
                                        STORAGE
                              WAIT    - WAIT FOR COMPLETION OF TRANSMISSION
                              END     - ALLOW REIDENTIFICATION OF USER
```

SCREEN # 1B

```
                    *** UCLA/GSLIS CARD SYSTEM - SELECTOR ***

THE FOLLOWING REQUESTS EXIST.  IF YOU WISH TO START OVER TYPE DE *

SEARCH                                      SEARCH
NUMBER     SEARCH STRING                    NUMBER     SEARCH STRING
-----------------------------------------------------------------------------
 0001.     AK=SHAKES WILL                    0002.     T=HAMLET
 0003.     T=HISTORY OF CHINA * AK=FITZ HENR 0004.     73-4082
 0005.     L=73-4082



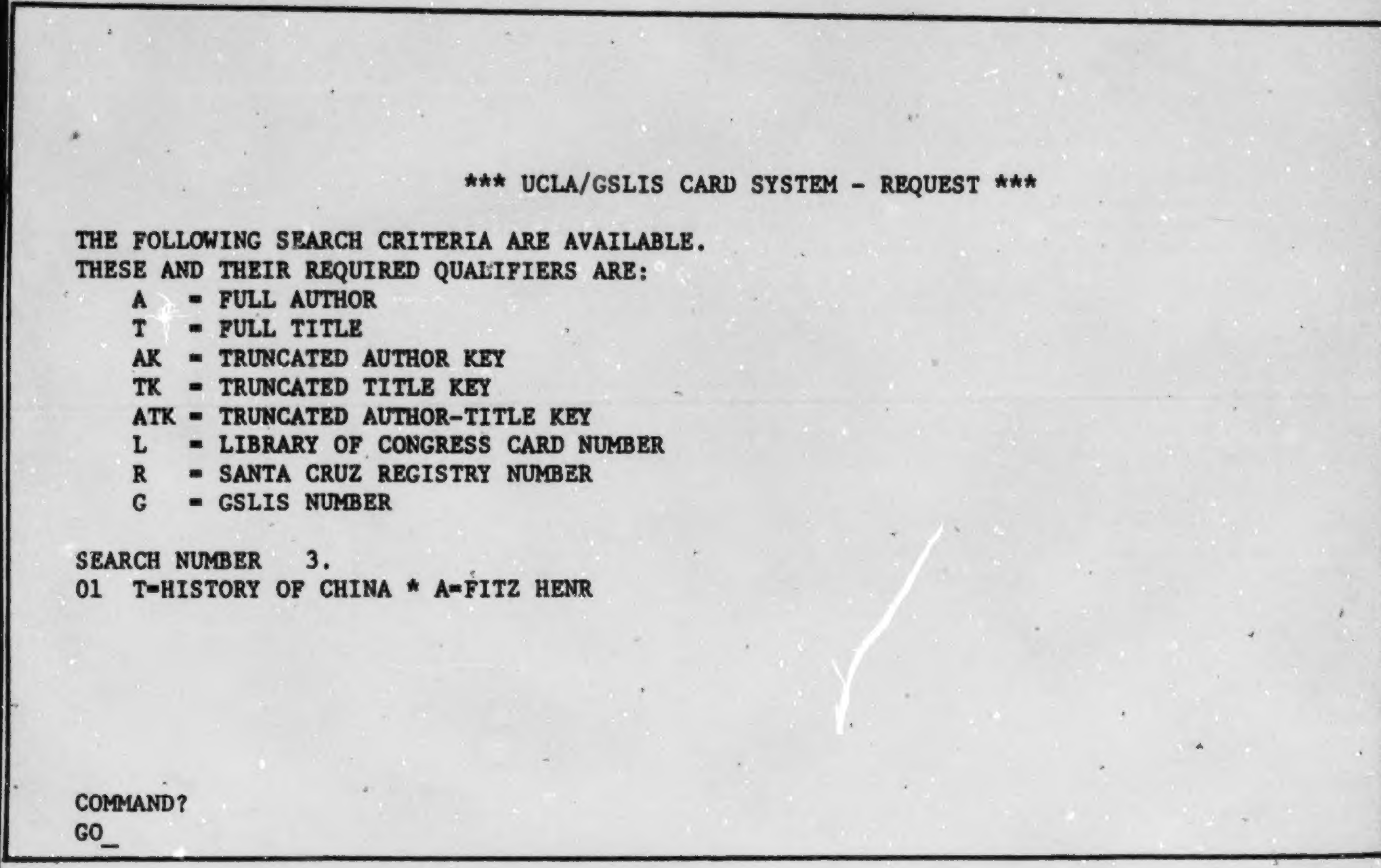






COMMAND?
-----------------------------------------------------------------------------
                                            NOTE:  SEARCH STRING CONTAINS 32 CHARACTERS
```

SCREEN # 2



```
                    *** UCLA/GSLIS CARD SYSTEM - REQUEST ***

THE FOLLOWING SEARCH CRITERIA ARE AVAILABLE.
THESE AND THEIR REQUIRED QUALIFIERS ARE:
    A   = FULL AUTHOR
    T   = FULL TITLE
    AK  = TRUNCATED AUTHOR KEY
    TK  = TRUNCATED TITLE KEY
    ATK = TRUNCATED AUTHOR-TITLE KEY
    L   = LIBRARY OF CONGRESS CARD NUMBER
    R   = SANTA CRUZ REGISTRY NUMBER
    G   = GSLIS NUMBER

SEARCH NUMBER   3.
01  T=HISTORY OF CHINA * A=FITZ HENR




COMMAND?
GO_
```

SCREEN # 3

```
                         *** UCLA/GSLIS CARD SYSTEM - SEARCH ***

TRANSMISSION FAILURE.  TRY AGAIN LATER
```

```
                         *** UCLA/GSLIS CARD SYSTEM - SEARCH ***

PREVIOUS DATA TRANSFER NOT YET COMPLETE.  WAIT?
```

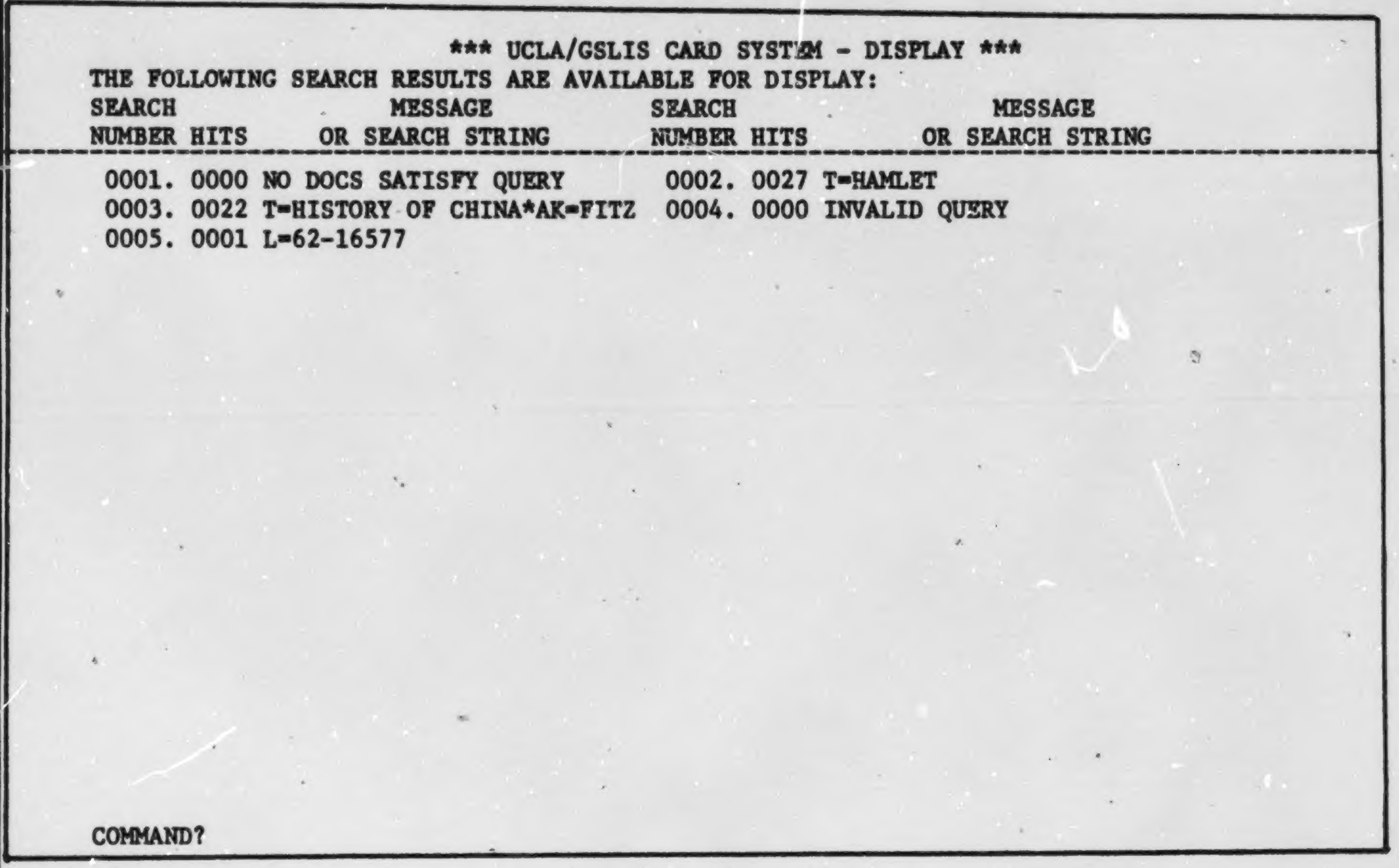
```
                         *** UCLA/GSLIS CARD SYSTEM - SEARCH ***

DO YOU WISH TO WAIT FOR TRANSMISSION TO COMPLETE?




WARNING:  IF YOU DO NOT WISH TO WAIT DO NOT USE THE CURRENT FILES UNTIL THE
TRANSMISSION COMPLETES.
```

SCREEN # 4A,B,C



```
                        *** UCLA/GSLIS CARD SYSTEM - DISPLAY ***
     THE FOLLOWING SEARCH RESULTS ARE AVAILABLE FOR DISPLAY:
     SEARCH              MESSAGE             SEARCH                   MESSAGE
     NUMBER HITS     OR SEARCH STRING        NUMBER HITS          OR SEARCH STRING
-----------------------------------------------------------------------------------------
      0001. 0000 NO DOCS SATISFY QUERY        0002. 0027 T=HAMLET
      0003. 0022 T=HISTORY OF CHINA*AK=FITZ   0004. 0000 INVALID QUERY
      0005. 0001 L=62-16577









     COMMAND?
```

* NOTE: MESSAGE OR SEARCH STRING CONTAINS 32 CHARACTERS

SCREEN #5

```
                         *** UCLA/GSLIS CARD SYSTEM - DISPLAY ***
SEARCH NO. 0003  T=HISTORY OF CHINA*AK=FITZ HENR        HIT NO. 0001 OF 0022

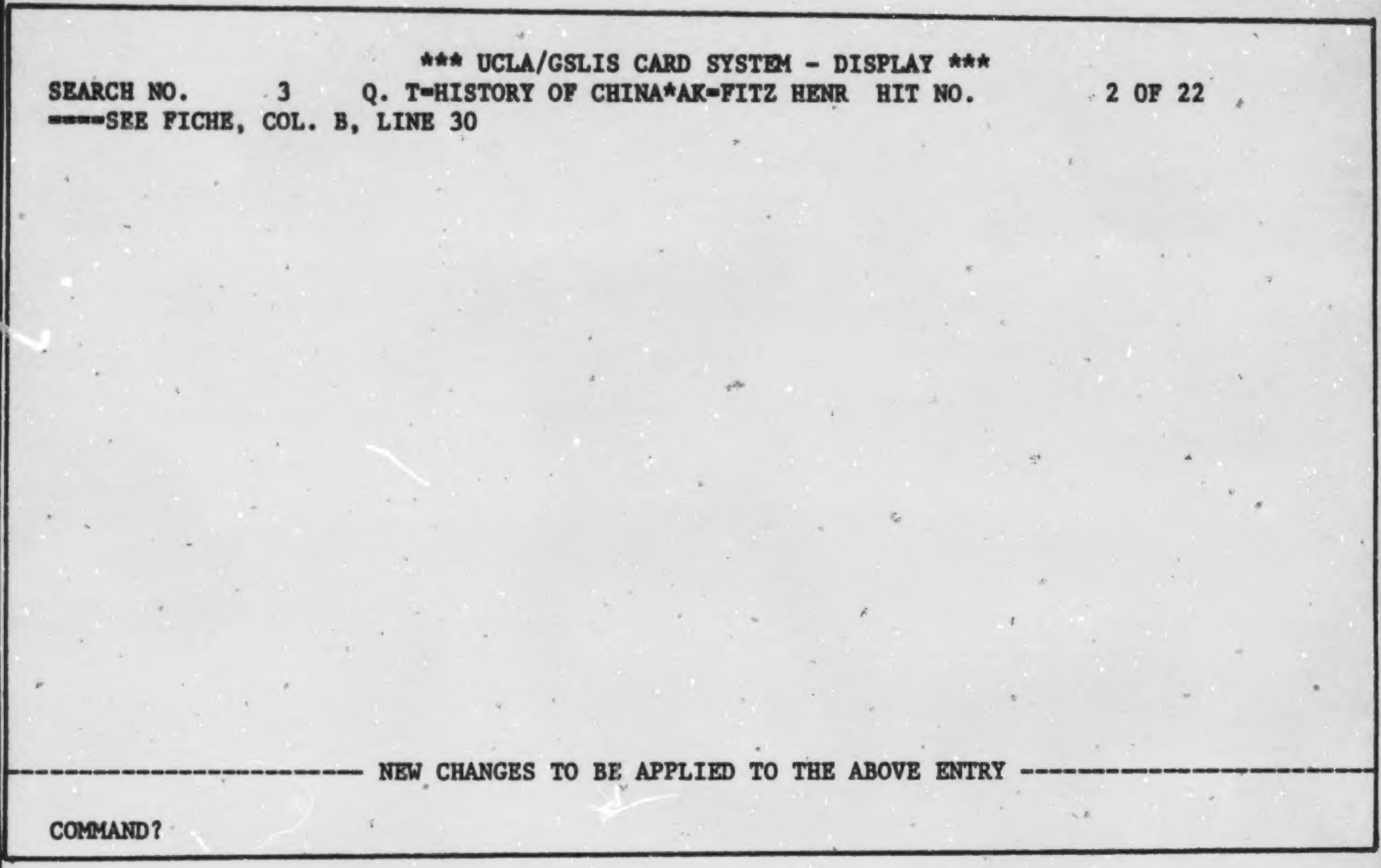



      FORMATTED
         BIB
        ENTRY




---------------------- NEW CHANGES TO BE APPLIED TO THE ABOVE ENTRY ----------------------
01 A=SMITH, JOHN J.
COMMAND?
```

SCREEN #6



```
                         *** UCLA/GSLIS CARD SYSTEM - DISPLAY ***
SEARCH NO.      3     Q. T=HISTORY OF CHINA*AK=FITZ HENR  HIT NO.          2 OF 22
====SEE FICHE, COL. B, LINE 30









---------------------- NEW CHANGES TO BE APPLIED TO THE ABOVE ENTRY ----------------------

COMMAND?
```

OLD
CHANGES
TO
ENTRY

SCREEN #7

```
                    *** UCLA/GSLIS CARD SYSTEM - CHANGE ***

TRANSMISSION FAILURE.  TRY AGAIN LATER
```

```
                    *** UCLA/GSLIS CARD SYSTEM - CHANGE ***

PREVIOUS DATA TRANSFER NOT YET COMPLETE.  WAIT?
```

```
                    *** UCLA/GSLIS CARD SYSTEM - CHANGE ***

DO YOU WISH TO WAIT FOR TRANSMISSION TO COMPLETE?





WARNING:  IF YOU DO NOT WISH TO WAIT DO NOT USE THE CURRENT FILES UNTIL THE
TRANSMISSION COMPLETES.
```

SCREEN # 8A,B,C

APPENDIX B

FILE NAMES
PROGRAM LIST
DISKETTE LIST

FILE NAMES

User Files	(on data diskette)
CARD.REQU	Request File
CARD.DISP	Display File
CARD.CHAN	Change File

Access File (on system diskette)

CARD. USERS

- Logon line for TSO contains entries for each valid user
- user name
- name of diskette volume containing user files
- file names

PROGRAM LIST

CARD - PL/I search program. Accepts input as batched search search requests for which it produces a display file of hits or applies a stream of changes to the bib file. Runs under TSO and uses the Network Sequential Access Method (NSAM) for data transfer to/from the Level 6.

SOURCE LOCATION:

LOAD LOCATION:

NSAM - Network Sequential Access Method. These rountines were developed and maintained by OAC/CCF. They provide an error free, controlled interface between a TSO program and a program running a terminal emulator in a remote minicomputer. The subroutines used by CARD are: NCNCT, NDISC, NGET, and NPUT. See OAC document S-215 ~~in Appendix D~~ for further explanation of NSAM.

SOURCE LOCATION: Contact OAC/CCF Data Communications Group

LOAD LOCATION: OAC library, SYS1.CCNPLIB

CNCT - Terminal emulation program, allowing the Level 6 to act as an intelligent terminal to the 360. This program sends all data passed to it by TSD to TSO as lines of input and outputs to TSD all output lines received. It also provides a mechanism for sending or receiving data files,using DAMIO and LPH.

SOURCE: CNCT.A on TSD diskette

OBJECT: CNCT.O on CARD diskette

LOAD: CNCT on CARD diskette (includes LPH)

LPH - Subroutine to CNCT allowing it to use the NSAM data transfer protocol. LPH = Line Protocol Handler. Constructs and decodes data packets and performs retransmission in the event of line error.

SOURCE: LPH.A on LPH diskette

OBJECT: LPH.O on CARD diskette

LOAD: CNCT on CARD diskete

TSD - TSO Session Driver. This routine simulates the actions of a person on a terminal, LOGGING on to TSO, invoking the CARD program, and generally controlling the TSO session. It is driven by LOGON/LOGOFF and file transfer requests made by elements of the CARD task within the Level 6.
SOURCE: TSD.A on TSD diskette
OBJECT: TSD.0 on CARD diskette
LOAD: TSD on CARD diskette

DAMIO - Diskette Access Method Input/Output. These routines allow sequential and direct access to relative data files and sequential access ro members of partitioned files. Used by CNCT, CDSELE, CDREQU, CDDISP, CDCHAN.
SOURCE: DAMIO.A on DAMIO diskette
OBJECT: DAMIO.0 on DAMIO diskette
LOAD: DAMIO on CARD diskette

ZIPAM
ZIOPEN
ZI2GET
ZIRLRE
- Slightly modified version of the BES2 Partitioned Access Method used in the offline system (Level 1)
SOURCE: ZIPAM.A, ZIOPEN.A, AND ZI2GET.A on DAMIO diskette and ZIRLRE.A on system source diskettes.
OBJECT: ZIPAM.0, ZIOPEN.0, ZI2GET.0 and ZIRLRE.0 on DAMIO diskette
LOAD: DAMIO on CARD diskette

RELIO - Allows byte displacement update I/O for relative files.
SOURCE: RELIO.A on DAMIO diskette
OBJECT: RELIO.0 on DAMIO diskette
LOAD: DAMIO on CARD diskette

CDROOT - Root segment of the Level 6 CARD task including interoverlay transfer and screen I/O subroutines and the CDDATA common data area.
SOURCE: CDROOT.P on CARD diskette (run MACRO first)
OBJECT: CDROOT.0 on CARD diskette
LOAD: CARD on CARD diskette

CDSELE - Function selector and user identify for CARD task.
SOURCE: CDSELE.P on CARD diskette (run MACRO first)
OBJECT: CDSELE.O on CARD diskette
LOAD: overlay CARD01 on CARD diskette

CDREQU - Searc h request function of CARD task.
SOURCE: CDREQU.P on CARD diskette (run MACRO fisrt)
OBJECT: CDREQU.O on CARD diskette
LOAD: overlay CARD02 on CARD diskette

CDSEARC - Search function of CARD task.
SOURCE: CDSEAR.P on CARD2 diskette (run MACRO fisrt)
OBJECT: CDSEAR.) on CARD diskette
LOAD: overlay CARD03 on CARD diskette

CDDISP - Display function of CARD task.
SOURCE: CDDISP.P on CARD2 diskette (run MACRO first)
OBJECT: CDDISP.O on CARD diskette
LOAD: overlay CARD04 on CARD diskette

CDCHAN - Change function of CARD task.
SOURCE: CDCHNA.P on CARD2 diskette (run MACRO first)
OBJECT: CFCHAN.O on CARD diskette
LOAD: overlay CARD05 on CARD diskette

DISKETTE LIST

DAMIO - DAMIO, ZIPAM, ZIOPEN, ZI2GET, ZIRLRE
RELIO
CARD - CDROOT, CDSELE, CDREQU
CARD2 - CDSEAR, CDDISP, CDCHAN
TSD - TSD, CNCT
LPH - LPH

3. THE CNCT PROGRAM

The CNCT program is an application running on the Level 6 which acts as an intelligent ASCII terminal with file transfer capabilities. The CNCT program transparently passes lines of text entered on a local KSR device to an asynchronous communication line and vice versa. It can also produce a hardcopy typescript of the session in either hex or ASCII representation for debugging.

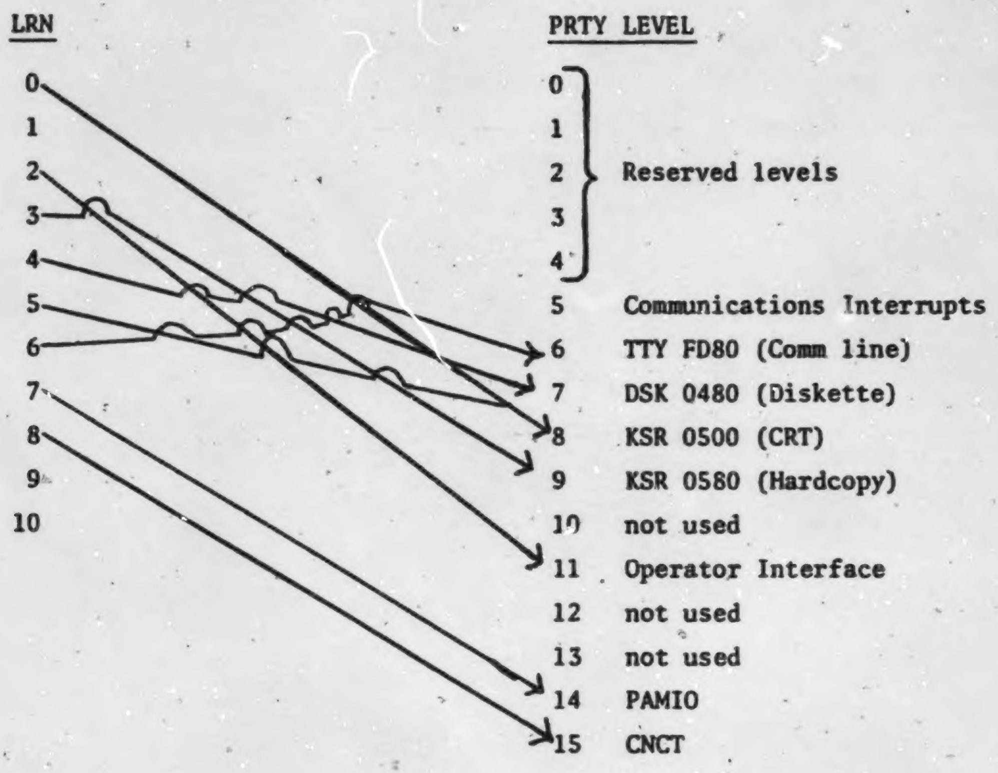
Configuration

CNCT must run as the lowest priority task in the application because BES2 does not provide a mechanism for waiting for multiple events. CNCT is, therefore, always active. PAMIO, a companion task, is used for disk I/O to partitioned files. The current configuration conventions are:

LRN 0 - Operator Console (KSR)
3 - Hardcopy Device (KSR or LPT)
4 - Diskette Device (Used by PAMIO)
5 - Local KSR (normally EQLRNed to 0)
6 - Remote line (TTY)
7 - Partitioned Access Method (PAMIO)

A typical configuration is:

(See the following page)



```
LACT CLMCOMM:COMM
ELACT
SYS 10,15,,D'5FFF'
TSA 2,16
TRAP 3,ZFPSIM
COMM 5
ADMOD PROGFILE:CNCT,X'0400'
ADMOD PROGFILE:PAMIO,X'0400'
ADMOD PROGFILE:ZXEX03,X'0400'
ADMOD PROGFILE:ZFPSIM,X'0400'
TASK CNCT,8,15,YACT
TASK PAMIO,7,14,NACT
OIM 2,11
DEVICE KSR,0,8,X'0500'
EQLRN 5,0
DEVICE DSK,4,7,X'0480'
DEVICE KSR,3,9,X'0580'
TTY 6,6,X'FD80',,1,300
QUIT
EOF
```

Operation

When first given control, the CNCT program establishes connections to the local device (LRN 5) and the remote device (LRN 6). From a pool of 25 IBU's (IORB/Buffer Units), three are permanently allocated for outstanding remote reads and one for an outstanding local read. These are issued as soon as a connection is established. At this point, a message is written on the operator's console telling the user that a connection has been established. The CNCT program then begins its continuous cycle looking for a complete I/O request (IBU).

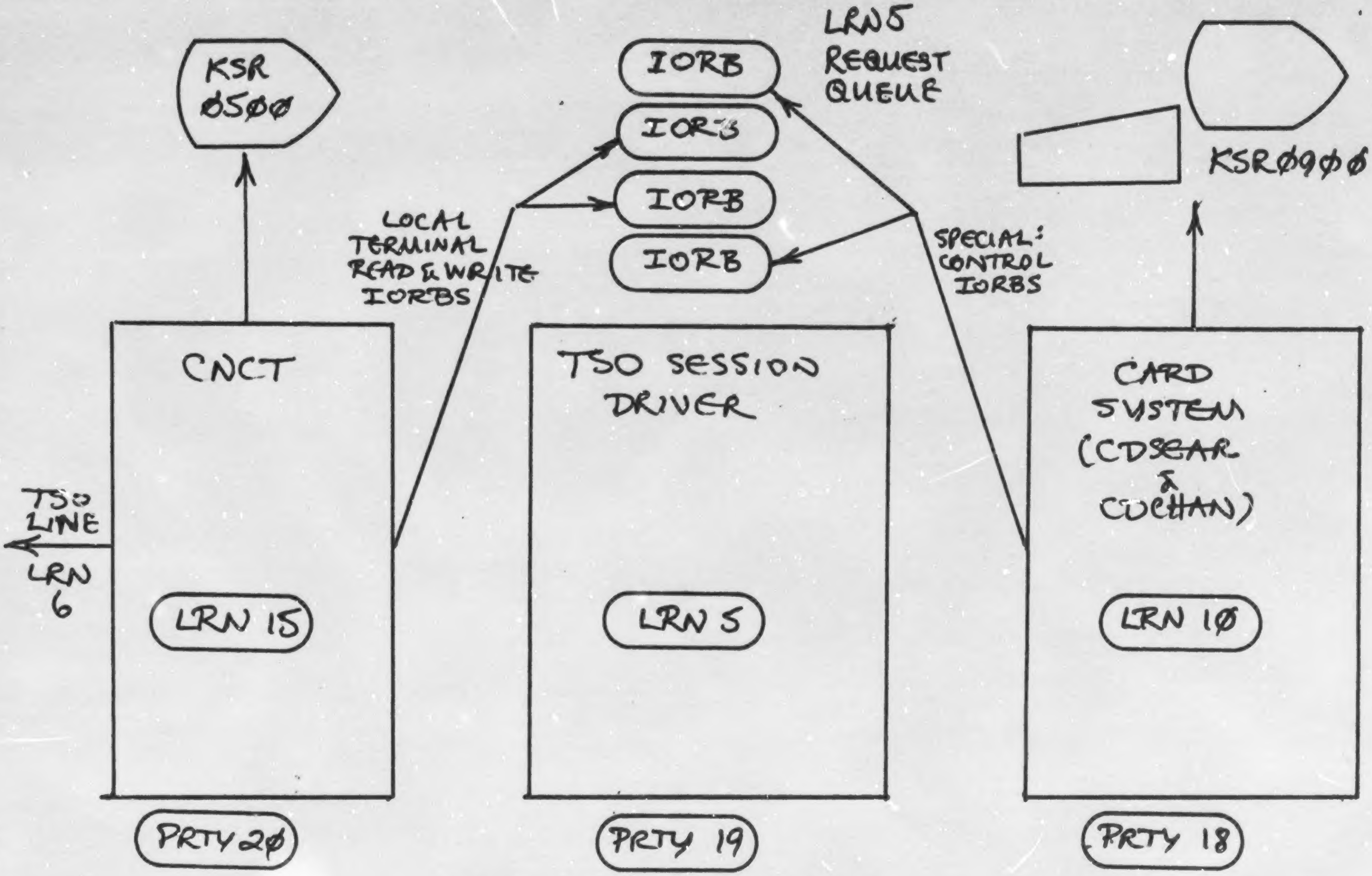
If an IBU is not yet complete and is the oldest remote read, a timer for one second is started, which, if it is triggered, will create a duplicate IBU dummied up to appear complete. The original IBU is updated to indicate how many characters had been received when the timer went off. This procedure is done to allow lines not ending in a CR to appear on the local CRT. Note, however, that the last byte of lines with an even number of characters will be retained within the MLCP and will not appear since data is transmitted a word at a time and TCAM precedes every line with a LF.

If an IBU completes and it was a write or a temporary or dummy read, it is released to the pool of free IBU's. If it is the oldest read completion, preparations are made to write the line to the other side (LRN 6 if read from LRN 5 or vice versa). If a write must be issued to the remote side, all outstanding reads are cancelled (using queue abort), a single temporary read is issued to catch a very rapid response and then the line is written. After the line is written, the read is re-issued for this IBU as are those for any IBU's cancelled by queue abort. In this way there are nearly always 4 outstanding reads on the remote line to allow for overlap.

Whenever a line is read, it is checked for an escape command (ESC character followed by a command to CNCT.) The commands are:

ESC ? or H	lists available escape commands
ESC	send break to remote device
ESC C new ESC	change escape character
ESC Q	quit. Disconnect and reconnect, hanging up the phone. Reinitializes CNCT.
ESC XN	turn on hex echo of all lines read from either side. Print on LRN 3.

ESC XF	turn off hex echo
ESC PN	turn off printing
ESC DF	turn off display. Nothing is displayed on the local device to allow more rapid file transfer.
ESC DN	turn display back on
ESC R file:member	reads contents of the indicated member and sends each card as a line of input to the remote side. Stops at end of file.
ESC R	stops reading immediately.
ESC W file:member	write every line received from remote side to indicated member
ESC W	stop writing
ESC T	test halt. Halt CNCT program to allow use of debugger


KSR 0500
LRN5 REQUEST QUEUE
IORB
IORB
IORB
IORB
KSR0900
LOCAL TERMINAL READ & WRITE IORBS
SPECIAL: CONTROL IORBS
CNCT
TSO SESSION DRIVER
CARD SYSTEM (CDSEAR & CDCHAN)
TSO LINE
LRN 6
LRN 15
LRN 5
LRN 10
PRTY 20
PRTY 19
PRTY 18

4. ASYNCHRONOUS DATA TRANSMISSION PROTOCOL

This subsection defines the asynchronous communications protocol for error free file transfer between the central campus computer facility and a remote mini/microcomputer. It is conceivable that it could be utilized for mini-mini communication, but it is more likely that an advanced, synchronous protocol will be used for that application.

PROTOCOL OVERVIEW

. All data transmissions and error recovery procedures are controlled by protocol handlers present in both the host and remote computers.

. The protocol handlers transmit/receive data in response to commands issued by a higher level program.

. All data are sent in the form of 'packets'. A 'packet' is defined as a collection of ASCII characters framed by appropriate starting and ending sequences.

. These framing sequences consist of a 'header', which preceeds the data, and a 'trailer', which follows the data. Packets containing no text can be sent to transfer control information between the protocol handlers. (control packet)

. Several packets may be required to transmit the entire data field of a send command from the higher level program.

. All characters transmitted in a packet are sent in 7 bit ASCII plus a parity bit. Only those characters whose ASCII representation is greater than x'20' (SPace character), less than but not including x'7f' (DELete character), plus the control characters:

x'02' (STX)	x'03' (ETX)
x'0D' (CB)	x'1B' (ESC)
x'1E' (IBS)	

166

are transmitted.

. Data containing control characters must be transmitted in a 'transparent' format. The transparency routine splits each character into 2 non-transparent characters before being sent.

. Each complete data transmission consists of sending a data packet and receiving an acknowledgement packet. An acknowledgement packet may be expanded to also contain data, thereby simulating a full duplex connection between the computers.

. An acknowledgement packet must be received before the next data packet can be sent. If an acknowledgement is not received within a pre-defined period of time, error recovery procedures will be initiated.

. The initial connection can be made by the protocol handler at either computer by sending a Request-For-Connection (RFC) packet. The receiving computer must respond with a Permission-For-Connection (PFC) packet.

. The RFC and PFC messages contain information defining parameters to be utilized during the data transfer.

. The connection can be broken by either computer by sending a Disconnect control packet (DISC) which should be acknowledged by the receiving protocol handler.

. All messages received by a protocol handler that violate the packet format are marked for special processing.

. Only packets received without error will result in data being passed to the higher level program. All others will be discarded TSO messages and alerts and a negative acknowledgement control packet (NAK) sent to request retransmission.

. Error recovery routines are assumed to be present in both protocol handlers. The line monitoring function required when the data link is active, is handled by the remote terminal.

The Packet Structure

PACKET FORMAT

PACKET HEADER	DATA	PACKET TRAILER
STX HEADER DATA	DATA	FCS CR

PACKET HEADER

- STX - packet identifier. 1st character in packet.

- HEADER DATA

  Byte #1 - Data Qualifier byte (DC). A value of 3 or less signifies a text packet with no control information for the receiving protocol handler. A DQ with a value greater than 3 indicates a control packet with information solely for the receiving protocol handler. The following is a list of the possible numerical codes in the DQ and their definitions:

  00 - non-transparent text packet (complete message or last packet of message)

  01 - non-transparent text packet (additional packets required to transmit complete message)

  02 - transparent text (complete message or last packet of message)

  03 - transparent text (additional packets required to transmit complete message)

  04 - positive acknowledgement that the last packet was received without error. (ACK)

  05 - request-for-connection (RFC). This code is accompanyed by multiple 2 byte codes describing the communication options available to the remote user.

  06 - permission for connection (PFC). This code is accompanyed by multiple 2 byte codes describing the communication options the remote wishes to utilize during the data transfer.

07 - disconnect (DISC)

08 - negative acknowledgement (NAK). last packet was received in error and must be retransmitted.

09 - flow control (WABT). positive acknowledgement of last packet but unable to accept more data.

10 - attention (ATTN)

11 - expected transmission not received (ENC). This is an error recovery procedure and is only sent by the remote computer.

12 - trace packet (debug facility)

- Byte #2 - N_s - module 7 block count for last packet sent.
- Byte #3 - N_r - module 7 block count for next packet expected.

DATA . The data field of a text packet consists of 0 - N_{max} ASCII characters preceeded by an optional 4 byte length field. The data field of a control packet consists of 0 - N ASCII characters, depending on the control packet type, which provide additional information to the line protocol handler.

PACKET TRAILER. 1-5 bytes consisting of an optional Frame Check Sequence (FCS) followed by either a CR or ETX as an ending character.

PROCESSING

CONNECT PROCESSING. Before the actual data transfer can begin, line protocol handlers in each computer must be activated and a Request-For-Connection packet must be sent. (fig. 1) Either computer can send the initial RFC packet, but unless otherwise specified, the host computer will send this packet to the remote. It consists of a packet header with the RFC control code and a data field. The data field consists of 4 bytes of maximum allowable packet size followed by a variable number of 2 byte numerical codes. Each code represents one of the following transfer options (if supported):

- Compression and Suppression
  - 00 - trailing blank suppression (default)
  - 01 - no compression or supression (no length in data field)
  - 02 - imbedded blank compression and trailing blank suppression
  - 03 - duplicate character compression (4 or more)
- Error Checking
  - 05 - 4 byte frame check sequence (FCS)
  - 06 - checksum
- Misc Transfer Options
  - 09 - multiple messages/packet
  - 10 - trace facility supported

The remote terminal must reply with a permission-for-connection message (PFC) that consists of the PFC control code plus a data field consisting of the packet size and the numerical codes representing the transfer options the remote wishes to utilize. If the FCS option is specified, all subsequent packets sent by either computer must contain the 4 byte FCS. If a PFC packet is not received by the host computer in 20 seconds, a 2nd RFC will be sent. If a PFC is still not received after a total of 3 RFC's have been sent, a disconnect (DISC) packet will be sent. (fig 2)

DISCONNECT PROCESSING. Either computer may terminate the asynchronous protocol transmissions by sending a control packet containing the disconnect control code. The protocol handler receiving this disconnect packet should notify it's higher level program and send an acknowledgement packet (fig 7). All subsequent transmissions between the computers will not be in the packet format. Should a line protocol handler remain active after the DISC packet has been sent and acknowledged, its only function would be to transparently pass all messages to its higher level program and scan the transmissions for a future RFC message.

Data Transmissions

. Data packets are transmitted between the computers in response to the commands, NETGET and NETPUT. A NETPUT request will result in a text packet (DC byte <4) being sent. The receiving computer verifies the block count (N_r) and FCS, and if no errors exist, sends a positive acknowledgement control packet (ACK) (fig 3). This acknowledgement packet contains both an incremented receive block count ($N_r = N_r + 1$). as well as an incremented send block count ($N_s = N_s + 1$). The data portion of the text block is then passed to the higher level program if a NETGET request had been issued.

. If an error was detected by the receiving computer, a negative acknowledgement control packet (NAK) is sent. The receive block count (N_r) is not incremented.

. If the packet is received without error but the receiver cannot accept additional data packets, a wait-a-bit (WABT) flow control packet is sent. The computer receiving the WABT cannot send additional data packets until an ACK is received. The computer sending the WABT packets must send additional WABT's every 20 seconds if it is unable to receive additional data packets.

. If the full duplex mode of transmission is supported by both computers, data could also be added to the acknowledgement packets. In full duplex mode, the incremented receive block count ($N_{r + 1}$) serves as a positive acknowledgement of the last data packet. Data destined for a higher level program can be added to positive acknowledgement packets only. Other control packets contain data destined only for the receiving protocol handler (RFC, PFC, & Trace).

NOTE - a 10 millisecond delay will be required before any packet can be sent to allow for hardware turnaround delays.

Error Recovery

. If either computer receives 5 consecutive block counts in error, the receiving protocol handler can send a disconnect message and terminate all outstanding NETPUT and NETGET requests abnormally.

. If the computer sending a data packet does not receive a response within 20 seconds, error recovery procedures will be initiated. Line monitoring functions will be controlled by the remote computer. Therefore, if the host does not receive an expected response, it should continue to wait and not attempt to resend the previous packet. If 5 consecutive timeouts occur, the NETPUT request is terminated abnormally and a disconnect packet is sent to the remote (Fig 5). If the remote computer does not receive an expected response from the host, a special inquiry control packet (ENQ) is sent. If the host does not respond to the ENQ, another inquiry will be sent until a total of 5 ENQ's have been transmitted. If a response is still not received, the file transfer link is assumed dead and a DISC packet is sent to the host. (Fig 6)

ASYNCHRONOUS DATA LINK EXAMPLES

INITIAL CONNECTION (No Errors)

Host --> Remote RFC DATA

Remote --> Host RFC ACK

fig 1

INITIAL CONNECTION (Error)

Host --> Remote RFC T1 Expires RFC RFC DISC

Remote --> Host No Response

fig 2

DATA TRANSFER (No Error)

Host --> Remote DATA-1 DATA-2 DATA-3

Remote --> Host ACK ACK ACK

fig 3

DATA TRANSFER (Error-Bad FCS or N_r)

Host --- Remote	DATA-1		DATA-1		DATA-2	
Remote --- Host		NAK		ACK		ACK

fig 4

DATA TRANSFER (Error-No Response)

Host --- Remote	DATA-1	T1	T2	T5	DISC
Remote --- Host		No Response			

fig 5

Host --- Remote		No Response			
Remote --- Host	DATA-1	T1	ENQ-1	ENQ-3	DISC

fig 6

DISCONNECTION

Host --- Remote	DATA-1		DISC	
Remote --- Host		ACK		ACK

fig 7

DATA PACKET TYPES

CONTINUED TEXT PACKET

PACKET HEADER	DATA	PACKET TRAILER
DQ=1	LEN DATA (400)	
DQ=0	LEN DATA (200)	

LEN = length of data includes the trailing blanks which are not transmitted.

The data length of the write command was 600 bytes.
The maximum packet data length was 400 bytes.
2 packets were require to transmit the entire message.

TRAILING BLANKS SUPRESSED

PACKET HEADER	DATA	PACKET TRAILER
DQ=0	LEN DATA	

LEN = length of data includes the trailing blanks which are not transmitted.

IMBEDDED AND TRAILING BLANKS SUPRESSED

PACKET HEADER	DATA	PACKET TRAILER
DQ=0	LEN DATA *	

LEN = length of data includes the trailing blanks which are not transmitted.

* = all of occurances of 3 blanks are more will be replaced with the sequence of x'1B' (ESC) and a 1 byte number of blanks supressed. (Max = 32)

DUPLICATE CHARACTER COMPRESSION AND TRAILING BLANK SUPPRESSION

PACKET HEADER **DATA** **PACKET TRAILER**

DQ=0 LEN DATA *

LEN = length of data including the compressed characters and the trailing blanks which are not transmitted.

* = all occurances of 4 or more duplicate characters will be replaced by the sequence of x'1B' (ESC), the character being compressed, and a 1 byte number of characters compressed. (Max=32)

MULTIPLE MESSAGES/PACKET

PACKET HEADER **DATA** **PACKET TRAILER**

DQ=0 LEN DATA IRS LEN DATA

LEN = length of data including the trailing blanks which are not transmitted.

IRS = inter-record separator denoting the end of the preceding record.

If the data length of the write command is less than the maximum packet length, several messages may be sent in a single packet. Each message is preceeded by a 4 byte length field. (Max = 65,536)

NSAM - LINE PROTOCOL HANDLER INTERFACE

. NSAM posts line protocol handler's (LPH) wakeup ECB.

. Parmlist resides in a workarea whose address is known to the LPH task via an ATTACH macro parameter.

. The LPH task posts the ECB specified in the parmlist to terminate the NSAM request.

PARMLIST (12 BYTES)

+0	(1)	Type of call: 00 - Control 04 - Get 08 - Put
+1	(3)	Address of data (2 bytes of length followed by actual data)
+4	(1)	Option byte: 00 - Nowait (Put, Get) 04 - Wait (Put, Get) 08 - Connect (Control) 0C - Disconnect (Control) 10 - ClearQ (Control) 14 - Attn (Control) 18 - Status (Control)
+5	(1)	Sub-option byte: 00 - Non-Transparent text 04 - Transparent text
+6	(2)	Timer value - maximum allowable time, in seconds, in which to complete the NSAM request
+8	(4)	Address of completion ECB

POST CODES - LPH TO NSAM

x'40nnnn00' - no errors
04 - additional data remaining (Get request only)
(nnnn = number of bytes of remaining data)

x'440000xx' - error in parm list
04 - invalid call type
08 - invalid option specified
0C - invalid data length or data address

10 - invalid timer interval

x'480000xx'- abnormal termination of NSAM request
04 - DISC or CLEARQ issued (Host side)
08 - DISC received from remote
0C - timer expired before request complete , no data transferred.
10 - ATTN signaled by remote
14 - no STX at start of packet.

TRANSPARENT ASCII ENCODING TECHNIQUES

The following encoding techniques are utilized to send 'transparent' ASCII data over the asynchronous packet network.

- Each byte of transparent text is sent as 2 bytes of non-transparent text.

HEX	FBCDIC	'2 for 1' ASCII
05	F0F5	3035

- The 4 byte length field which preceeds each message in a text packet is encoded in the same manner.

HEX	FBCDIC	'2 for 1' ASCII
0190	F0F1F9F0	30313930

- The data qualifier byte (DQ) and the 1 byte length field found in the duplicate character compression schemes is encoded as follows.

1) HOST TRANSMITTING DQ

   - AND DQ with x'5F'
   - OR byte with x'40'
   - translate this newly created ASCII code to EBCDIC
   - move this DQ into the send buffer which will again be translated to ASCII by TCAM before being sent to the remote computer.

EX

```
DQ=0A  (ATTN)              AND x'5F' =  x'0A'
                            CR x'40' =  x'4A'
                 translate to EBCDIC =  x'D1'
                 translated by  TCAM =  x'4A'
```

2) HOST RECEIVING DQ

   - Translate EBCDIC DQ into its ASCII equivalent
   - AND resluting byte with x'1F' to recover original DQ

EX

```
DQ=x'D1'  (in buffer)   translate to ASCII  =  x'4A'
                                 AND x'1F'  =  x'0A'
```

3) REMOTE TRANSMITTING DQ

- AND hex DQ with x'5F'
- OR byte with x'40' and transmit to host

EX

DQ=0A AND x'5F' = x'oA'
OR x'40' = x'4A'

4) REMOTE RECEIVING DQ

- AND ASCII DQ with x'1F' to recover original value.

EX

DQ= x'4A' AND x'1F' = x'0A'

5. NETWORK SEQUENTIAL ACCESS METHOD

This sub-section describes the Network Sequential Access Method (NSAM) subroutine package provided for TSO application programs. NSAM uses the communication disciplines described in the sub-section on 'Asynchronous Data Transmission Protocol'. The following write-up is copied directly from the description provided by the Office of Academic Computing, UCLA.

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Academic Computing Facilities

S-215

Network Sequential Access Method

OAC Data Communications Group

L. F. Rivas

November 15, 1978

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2. PACKAGE STRUCTURE

The NSAM package is written in three components for maintainability. The three components are:

(1) the Application Program Interface (API),

(2) the Line Protocol Handler Interface (LPHI), and

(3) the Line Protocol Handler (LPH).

The API is written in PL/1 and contains the entry addresses used by the application program to request NSAM services. The API will copy the information passed by the application program into the standard NSAM Request Parameter List (NRPL). The API will then CALL the LPHI, passing the NRPL as a parameter.

The LPHI is written in OS/360 Assembly Language. It is the responsibility of the LPHI to ATTACH the LPH when necessary. The LPHI passes the NRPL to the LPH by a simple WAIT/POST mechanism.

The CSECTs for the API and the LPHI, after processing by the Linkage Editor program, are in the same load module as the application program. These routines become a part of the application program in the same manner that the TGET and TPUT routines of the PLITPUT package do.

The LPH is also written in OS/360 Assembly Language. It is the responsibility of the LPH to perform all line I/O and buffer management. The LPH does not become a part of the application program in the sense that the API and LPHI do. Keeping the LPH separate allows it to be modified without impacting any existing applications.

3. NSAM REQUEST PARAMETER LIST

The NRPL is twelve bytes long and contains the following information:

Offset	Length	Contents
+0	(1)	Type of Call X'00' - Control X'04' - NetGet X'08' - NetPut
+1	(3)	Data Area address or Zeroes
+4	(1)	Option Byte X'00' - Nowait (NetGet,NetPut) X'04' - Wait (NetGet,NetPut) X'08' - Connect (Control) X'0C' - Disconnect (Control) X'10' - ClearQD (Control) X'14' - ClearQI (Control) X'18' - ClearQO (Control) X'1C' - Attn (Control) X'20' - Status (Control)
+5	(1)	Sub-Option Byte X'80' - Transparent Text (NetPut) X'40' - Passive (Control) X'20' - Trace (Control) X'10' - Clear All (Control) X'08' - Special Fold (Control) X'04' - Discard (Control) X'02' - Statistics (Control)
+6	(2)	Time-Out Value
+8	(1)	Reserved Option Byte
+9	(3)	Completion ECB address

Where:

- The Type of Call must be set to one of the defined codes for each request.
- The Data Area must be an aligned half-word immediately followed by a variable number of bytes. When the application is passing data to NSAM, the half-word contains the length of data NSAM is to use. When the application expects data to be returned from NSAM, the application sets the half-word to the maximum length that NSAM may use and NSAM changes the half-word to the length actually used. In all cases, the length value should not include the two byte length of the half-word.

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- The Option Byte must be set to one of the defined codes for each request.

- The Sub-Option Byte, unlike the Type of Call and Option Byte, is treated as a "bit-string" rather than a "value". Each request may have zero, one, or more bits set as necessary.

- The Time-Out Value is expressed in seconds. A zero value will disable the timer for the request. If the time to service a request exceeds the Time-Out Value, the request will be aborted with an appropriate return code.

- The Completion ECB must be an aligned full-word in non-protected storage. After issuing an NSAM request, neither the Data Area nor the Completion ECB should be altered by the application until the ECB has been POSTed indicating the request has completed.

The NRPL is described by the following DSECT:

```
NRPL     DSECT          NSAM Req. Parm. List
REQTYPE  DS    X        Type of Request
NETCNTL  EQU   00       Control Request
NETGET   EQU   04       Receive Request
NETPUT   EQU   08       Send Request
NETDATA  DS    AL3      Addr of Data Area
NETOPT1  DS    X        Request Options
OPNOWAIT EQU   00       No Wait
OPWAIT   EQU   04       Wait
OPCONN   EQU   08       Connect
OPDISC   EQU   12       Disconnect
OPCLRQD  EQU   16       Clear Input Data Queue
OPCLRQI  EQU   20       Clear Input Request Queue
OPCLRQO  EQU   24       Clear Output Request Queue
OPATTN   EQU   28       Send an Attention
OPSTATUS EQU   32       Status Request
NETOPT2  DS    X        More Request Options
OPTRNSP  EQU   X'80'    Transparent Text
OPPASS   EQU   X'40'    Let Remote Send RFC
OPTRACE  EQU   X'20'    Line Trace Requested
OPCLRALL EQU   X'10'    Clear Entire Queue
OPFOLD   EQU   X'08'    Use Special Folding
OPINVALD EQU   X'04'    Discard Invalid Messages
OPSTATS  EQU   X'02'    Statistics Requested
NETTIME  DS    H        Request Time-Out Value
NETOPT3  DS    X        Reserved Request Options
NETECB   DS    AL3      Addr of Completion ECB
```

4. COMPLETION ECB CODES

The Completion ECB will be POSTed with one of the following codes when an NSAM request completes:

X'40000000' - Request completed with no errors.

X'4000nnnn' - NetGet request completed with no errors.
nnnn - Length of remaining message. (Data Area too small to hold entire message).

X'440000xx' - Request error.
04 - Invalid Type of Call.
08 - Invalid Option specified.
0C - Invalid Data Area.
10 - Invalid Time-Out Value.
14 - Transparency not supported by remote.

X'480000xx' - Abnormal termination.
04 - Cancelled due to Disconnect or Clear Queue.
08 - Cancelled due to Disconnect from remote.
0C - Cancelled due to Time-Out.
10 - Cancelled due to Attn from remote.
14 - Bad packet received from remote.

5. APPLICATION PROGRAM INTERFACE

The API component of the NSAM package may be called from any PL/1 application program. Each possible request type is handled by a different ENTRY into the API subroutine. Each ENTRY requires two to four parameters. The four parameter types, and their symbolic names within the subroutine, are:

- DATA - CHARACTER(*) VARYING - Data Area
- TYPE - CHARACTER(*) - Options
- DT - BINARY FIXED(15,0) - Time-Out Value
- ECB - BINARY FIXED(31,0) - Completion ECB

The processing performed by each of the various routines is described below. In all cases, the NRPL is built using the parameters passed to the routine. The API then CALLs the LPHI passing the NRPL as a parameter. The LPHI will eventually return control to the API when the request is accepted or completed. The API then returns to the routine that invoked it.

In all cases, the DT and ECB parameters must be passed to the API. The value in the DT parameter is copied to the NETTIME field in the NRPL. The NETECB field in the NRPL is set to the <u>ADDRess</u> of the ECB parameter. Note that NETOPT3 will always be set to X'00' since this field is reserved at this time.

5.1. NCNCT

Is used to request the Control function Connect. NCNCT is invoked by:

```
CALL NCNCT(TYPE,DT,ECB);
```

The REQTYPE field is set to NETCNTL. The NETDATA field is set to zero since no Data Area is required. The NETOPT1 field is set to OPCCNN.

The NETOPT2 field is set according to the contents of TYPE. Initially, NETOPT2 is set to X'00'. If the following character strings appear in TYPE, then the named bit pattern will be set in NETOPT2:

String	Option
PASSIVE	OPPASS
TRACE	OPTRACE
FOLD	OPFOLD
DISCARD	OPINVALD
STATS	OPSTATS

5.2. NDISC

Is used to request the Control function Disconnect. NDISC is invoked by:

```
CALL NDISC(DT,ECB);
```

The REQTYPE field is set to NETCNTL. The NETDATA field is set to zero since no Data Area is required. The NETOPT1 field is set to OPDISC. The NETOPT2 field is set to X'00'.

5.3. NCLRQD

Is used to request the Control function Clear Input Data Queue. NCLRQD is invoked by:

```
CALL NCLRQD(TYPE,DT,ECB);
```

The REQTYPE field is set to NETCNTL. The NETDATA field is set to zero since no Data Area is required. The NETOPT1 field is set to OPCLRQD. The NETOPT2 field is set to X'00' or, if TYPE is the string 'ALL', then NETOPT2 is set to OPCLRALL.

5.4. NCLRQI

Is used to request the Control function Clear Input Request Queue. NCLRQI is invoked by:

```
CALL NCLRQI(TYPE,DT,ECB);
```

The REQTYPE field is set to NETCNTL. The NETDATA field is set to zero since no Data Area is required. The NETOPT1 field is set to OPCLRQI. The NETOPT2 field is set to X'00' or, if TYPE is the string 'ALL', then NETOPT2 is set to OPCLRALL.

5.5. NCLRQO

Is used to request the Control function Clear Output Request Queue. NCLRQO is invoked by:

```
CALL NCLRQO(TYPE,DT,ECB);
```

The REQTYPE field is set to NETCNTL. The NETDATA field is set to zero since no Data Area is required. The NETOPT1 field is set to OPCLRQO. The NETOPT2 field is set to X'00' or, if TYPE is the string 'ALL', then NETOPT2 is set to OPCLRALL.

5.6. NATTN

Is used to request the Control function Send an Attention. NATTN is invoked by:

```
CALL NATTN(DT,ECB);
```

The REQTYPE field is set to NETCNTL. The NETDATA field is set to zero since no Data Area is required. The NETOPT1 field is set to CPATTN. The NETOPT2 field is set to X'00'.

5.7. NSTATS

Is used to request the Control function Status Request. NSTATS is invoked by:

```
CALL NSTATS(DATA,DT,ECB);
```

The REQTYPE field is set to NETCNTL. The NETDATA field is set to the ADDRess of the DATA parameter. The NETOPT1 field is set to OPSTATS. The NETOPT2 field is set to X'00'.

When the request completes, the DATA parameter may be immediately used in a TPUT to display the NSAM statistics. NSTATS requires the preceeding NCNCT request to have had the TYPE parameter include STATS.

5.8. NGET

Is used to request a NetGet. NGET is invoked by:

```
CALL NGET(DATA,TYPE,DT,ECB);
```

The REQTYPE field is set to NETGET. The NETDATA field is set to the ADDRess of the DATA parameter. The NETOPT1 field is set to OPNOWAIT or, if TYPE is the string 'WAIT', then NETOPT1 is set to OPWAIT. The NETOPT2 field is set to X'00'.

When the request completes, the DATA parameter will contain the next available message. If the DATA parameter is not long enough, the remainder of the message will be delivered in the succeeding NGET issued.

5.9. NPUT

Is used to request a NetPut. NPUT is invoked by:

```
CALL NPUT(DATA,TYPE,DT,ECB);
```

The REQTYPE field is set to NETPUT. The NETDATA field is set to the ADDRess of the DATA parameter. The NETOPT1 field is set to OPNOWAIT or, if TYPE is the string 'WAIT', then NETOPT1 is set to OPWAIT. The NETOPT2 field is set to X'00'.

The DATA parameter contains the message that is to be transmitted by NSAM. The message must not contain any special characters.

5.10. NPUTT

Is used to request a NetPut. NPUTT is invoked by:

```
CALL NPUTT(DATA,TYPE,DT,ECB);
```

The REQTYPE field is set to NETPUT. The NETDATA field is set to the ADDRess of the DATA parameter. The NETOPT1 field is set to OPNOWAIT or, if TYPE is the string 'WAIT', then NETOPT1 is set to OPWAIT. The NETOPT2 field is set to OPTRNSP.

The DATA parameter contains the message that is to be transmitted by NSAM. The message may contain any character that is mutually acceptable to the two processors.

6. LINE PROTOCOL HANDLER INTERFACE

The LPHI component of the NSAM package, although usually called only from the API, may be called from any application program routine that can build an NRPL. The LPHI passes the NRPL to the LPH and then WAITs for the LPH to POST the LPHI indicating that the LPH has queued the request. The LPHI will then return control to the caller, optionally WAITing for the request to be POSTed complete.

The NWAIT routine, which can be used to suspend processing until an ECB has been POSTed, is coded with the LPHI for convenience.

6.1. LPHI

The LPHI performs the following steps while processing a request:

- Program entry housekeeping;
- If necessary ATTACH the LPH, passing the address of a parm field;
- Pass the NRPL to the LPH via the parm and POST the LPH;
- WAIT for the LPH to POST the parm accepted ECB;
- If it is a Control request or the request indicates OPWAIT, WAIT for the LPH to POST the request complete;
- Exit housekeep and return control to the caller.

Whenever the LPHI must WAIT for the LPH, it uses an ECBLIST that also contains the subtask completion ECB for the LPH. This is to avoid the possibility of hanging the application program in the LPHI because of a malfunctioning LPH.

The LPHI checks the LPH subtask completion ECB before passing the NRPL to the LPH and after the two possible WAITs for the LPH. If this ECB is ever POSTed, the LPHI will set a flag indicating that another ATTACH is necessary, DETACH the remains of the previous LPH, and WTP the message:

*** LPH ERROR ***

if the LPH terminated abnormally.

If the LPH terminated before the current request could be given to it, it is ATTACHed and then the request is given to it. If the LPH terminated while processing the request, processing returns to the caller ignoring any OPWAIT directive.

7. LINE PROTOCOL HANDLER

The LPH component of the NSAM package manages internal queues of request buffers while monitoring line I/O. The LPH was designed to be easily changable without requiring changes to existing application programs using it.

The actions taken for the various possible requests are explained below. The actual logic of the LPH is omitted since the design is flexible and subject to change.

7.1. CONTROL REQUESTS

The Control requests are given priority by the LPH. Control requests may cause queued NetGet or NetPut requests to complete.

The Control requests all have NETCNTL as the REQTYPE. Each request is further identified by the NETOPT1 field. Note that all Control requests are assumed to complete within a reasonable length of time; therefore, the timer is disabled even when NETTIME is non-zero.

7.1.1. CONNECT

When the NETOPT1 field specifies OPCONN, the request is a Connect. A Connect is used to establish NSAM communications between the two processes. Connect processing is complete when both processes have issued Connect. Various options may be specified in the NETOPT2 field as follows:

- OPPASS - indicates that the request is "passive". Connect processing results in two packets, the RFC and PFC, being sent between the processes. Usually the central host sends the RFC then waits for the PFC. OPPASS commands the central host to first wait for an RFC from the remote then respond with the PFC.
- OPTRACE - indicates that an NSAM "trace" is requested. The user must have ALLOCATEd the FILE(TRACE) into which the LPH will write a history of the line activity and requests processed.
- OPFOLD - indicates that NSAM is to use "special fold processing". This feature was added mainly as a convenience for the FTP application however, it is available to any process. Normally, when the Data Area in a NetGet is too small, the remaining message is delivered in the next NetGet. FTP defines that a message is a one-byte-code that is followed by data. When OPFOLD is specified, the LPH will insert a dummy-first-byte in the Data Area for any NetGet that is delivering the remainder of a previous message.

6.2. NWAIT

The NWAIT routine provides the application program with a simple mechanism whereby processing may be suspended while an ECB is posted.

The NWAIT routine issues a WAIT ECBLIST= using the parameter list passed to it. The WAIT is satisfied by the POSTing of only one ECB, regardless of the number of entries in the parameter list.

If the parameter list contains only one entry, a WAIT ECB= is issued instead. In addition, if the ECB was already POSTed, the WAIT is <u>not</u> issued, thus avoiding extra overhead.

Assume that the PL/1 application program contains the following:

```
DECLARE (ECB1,ECB2,ECB3) BINARY FIXED(31,0);
DECLARE NWAIT ENTRY;
```

and that the variables ECB1, ECB2, and ECB3 are being treated as ECBs. To then WAIT for any of these variables to be POSTed requires only:

```
CALL NWAIT(ECB1,ECB2,ECB3);
```

- OPINVALD - indicates that NSAM is to "discard invalid messages". This feature was added mainly as a convenience for the FTP application however, it is available to any process. Normally, when a packet is received in error the message will be placed in the Data Area and the NetGet will be POSTed with an exceptional condition. When OPINVALD is in effect, any bad messages are simply discarded by the LPH without any notification to the application program.
- OPSTATS - indicates that NSAM is to accumulate "statistics". Since gathering statistics requires some extra overhead, this function is not automatic. The statistics may be displayed at any time before the Disconnect Control request is issued by a Status Control request.

7.1.2. DISCONNECT

When the NETOPT1 field specifies OPDISC, the request is a Disconnect. A Disconnect is used to break the NSAM communication path. Any queued NetGet and NetPut requests will be POSTed complete with an exceptional condition.

7.1.3. CLEAR INPUT DATA QUEUE

When the NETOPT1 field specifies OPCLRQD, the request is a Clear Input Data Queue. This Control request causes the first message, or message remainder, in the FIFO queue of messages to be delivered via NetGet to be discarded.

If there are no messages waiting for a NetGet, then the request performs no action. If the NETOPT2 field specifies OPCLRALL, then all messages in the queue are discarded.

7.1.4. CLEAR INPUT REQUEST QUEUE

When the NETOPT1 field specifies OPCLRQI, the request is a Clear Input Request Queue. This Control request causes the first pending NetGet, in the FIFO queue of NetGet requests, to be POSTed complete with an exceptional condition.

If there are no NetGet requests in the queue, then the request performs no action. If the NETOPT2 field specifies OPCLRALL, then all pending NetGet requests in the queue are discarded.

7.1.5. CLEAR OUTPUT REQUEST QUEUE

When the NETOPT1 field specifies OPCLRQO, the request is a Clear Output Request Queue. This Control request causes the first pending NetPut, in the FIFO queue of NetPut requests, that is not in the process of being transmitted, to be POSTed complete with an exceptional condition.

If there are no eligible NetPut requests in the queue, then the request performs no action. If the NETOPT2 field specifies OPCLRALL, then all eligible pending NetPut requests in the queue are discarded.

7.1.6. SEND AN ATTENTION

When the NETOPT1 field specifies OPATTN, the request is a Send an Attention. This Control request causes an ATTN packet to be sent to the remote process.

If the remote process has a pending NetGet request, the request is POSTed complete with an exceptional condition. If the remote process does not have a NetGet pending, but it does have a NetPut pending, then the NetPut request will be POSTed complete with an exceptional condition. The Data Area from the NetPut will not have been transmitted. If there are no queued requests, the attention signal is discarded and the application program is never notified that an attention arrived.

7.1.7. STATUS REQUEST

When the NETOPT1 field specifies OPSTATUS, the request is a Status Request. This Control request formats the Data Area as the argument of a TPUT. This request performs no action if the Connect for the communication path did not specify OPSTATS. The information to be displayed via the TPUT is the NSAM statistics for the connection.

7.2. NETGET

When the REQTYPE field specifies NETGET, the request is added to a FIFO queue of NetGet requests. As message packets are transmitted from the remote process, NSAM copies the messages to the Data Area of the "oldest" NetGet and POSTs it complete. A NetGet is satisfied by at most one message, even if there is sufficient Data Area to receive more than one message.

Since a packet can optionally contain more than one message, and since NSAM can queue messages if no NetGet requests are queued, there is no way to determine the exact length of time needed to satisfy a NetGet.

Many of the Control requests can cause a NetGet request to be cancelled and POSTed with an exceptional condition. Also, an attention signal from the remote process can cause a NetGet request to be POSTed with an exceptional condition.

7.3. NETPUT

When the REQTYPE field specifies NETPUT, the request is added to a FIFO queue of NetPut requests. The Data Areas of these requests are then copied into message packets that are transmitted to the remote process. As the remote process acknowledges the message packets, NSAM POSTs the NetPut requests complete. Each NetPut is considered to be one message.

Since a packet can optionally contain more than one message, and since NSAM can not control delays at the remote processor, there is no way to determine the exact length of time needed to process a NetPut.

Many of the Control requests can cause a NetPut request to be cancelled and POSTed with an exceptional condition. Also, an attention signal from the remote process can cause a NetPut request to be POSTed with an exceptional condition.

6. Data Base Programs

This sub-section describes the programs prepared, in PL/I, for operation on the central campus computer facility. They provide capability to do the following:

(1) Create the data bases
(2) Establish and maintain on-line files
(3) Search on-line files
(4) Set-up experiments

DATA BASE CREATION PROGRAMS

These provide capability to process MARC-like records, specifically those in the machine-readable data base containing the Registry File of the University of California at Santa Cruz (as of 1978). They handle selection and editing of records, treatment of individual fields within the MARC-like records, and output of the various files that are the basis for the operational use.

Selection. Basically, every record in the Santa Cruz file is included in the fiche file, and every 60th record is selected for inclusion in the on-line file. In addition, specific other records (as identified by Santa Cruz registry number) were included in the on-line file.

Records that would otherwise be included in one or both of the data bases may have been rejected for a number of reasons, as follows:

(1) "Garbage" records. A record was to be rejected if it did not contain at least one valid variable field. No such records exist in the Santa Cruz file.

(2) Records that are too long. If a record would be more than 60 lines long in the fiche file, it was rejected for inclusion in the fiche file. If it would be more than 22 lines long in the on-line file, it was rejected for inclusion in the on-line file.

(3) Too many terms. If a record yielded more than 50 author terms or more than 50 title terms, it was rejected.

The above criteria caused very few records to be rejected, slightly more than .1% of the records in the file -- a total of 340 of the 288,450 in the source file.

Figure 1.

MARC tag	S.C. tag	Program tag	Notes	Description
8	8	1	1	Fixed-length data elements
15	15	41	1	Miscellaneous
20	20	42	1	"
25	25	43	1	"
40	40	44	1	"
41	41	45	1	"
43	43	46	1	"
60	60	47	1	"
70	70	48	1	"
86	86	49	1	"
90	90	2	2,5	Local [Santa Cruz] call no.
--	99	0	6	Miscellaneous numbers
100	100	4	3	Main entry, personal author
110	100	5	3	Main entry, corporate author
111	100	6	3	Main entry, conference or meeting
130	130	7	4	Main entry, uniform title
240	240	8	4	Uniform title (not main entry)
241	241	9	4	Romanized title
245	245	10	4	Title proper (not main entry; traced)
--	246	10	4	Title proper (not main entry; not traced)
--	248	10	4	Title proper (main entry)
250	250	11	2	Edition statement
260	260	12	2	Imprint
300	300	13	2	Collation
350	350	50	1	Bibliographic price
400	400	14	3	Series: Personal name & title
410	400	15	3	Series: Corporate name & title
411	400	16	3	Series: Conference or meeting & title
440	440	17	4	Series: Title
490	490	18	4	Series: Untraced or traced differently
500	500	19	2	Note
501	501	20	2	"
502	502	21	2	"
504	504	22	2	"

Editing. Records are edited in two ways - to eliminate sorting subfields and to eliminate or translate characters that cannot be displayed.

(1) Sorting subfields. The Santa Cruz source file contains sorting subfields (coded $s) that indicate that a portion of text is to be printed in one form but sorted in another. For example, if a book has the title "4 heroes", this would be stored in the record as follows:

$sfour heroes$a4 heroes

This indicates that the title is to be printed in the Santa Cruz catalog in the form "4 heroes" but is to be sorted as if it read "four heroes". The GSLIS data-base creation program ignores all $s subfields.

(2) Elimination and translation of characters. In processing Santa Cruz records, characters that cannot be displayed on the IBM 3277 terminal are either eliminated or converted to other characters. The characters that are eliminated are accents and diacriticals; thus a title such as

Für Planché

is converted to

Fur Planche

Three non-displayable characters are not eliminated, but are converted to other characters, as follows:

! is converted to .

[is converted to <

] is converted to >

Thus a sequence such as

Hallelujah! [by] Herbert Smith

is converted to

Hallelujah. <by> Herbert Smith

(Exclamation points are displayable on 3277's but they are translated in the present case because the exclamation point is the default attention character in the UCLA Superselector system.)

(3) Treatment of individual MARC fields. Fig. 1 (following page) summarizes the treatment of each MARC field that may be incorporated in a fiche record or an on-line record. Any field that occurs in a Santa Cruz record, but is not listed in Fig. 1, is ignored. For various reasons, Santa Cruz does not apply the MARC field tags exactly as L.C. does (and uses three tags- 99, 246, and 248 -- that L.C. does not use). The program uses yet another set of tags for convenience in processing. The original MARC tags, their Santa Cruz equivalents, and the tags used in the program, are given in the first three columns of Fig. 1.

Figure 1. (cont'd)

MARC tag	S.C. tag	Program tag	Notes	Description
505	505	23	2	Note
520	520	24	2	"
600	600	25	2	Subject tracing
610	600	26	2	"
611	600	27	2	"
630	630	28	2	"
650	650	29	2	"
651	651	30	2	"
700	700	31	3	Personal author added entry
710	700	32	3	Corporate author added entry
711	700	33	3	Conference or meeting added entry
730	730	34	4	Uniform title added entry
740	740	35	4	Title added entry
800	800	36	3	Personal author series added entry
810	800	37	3	Corporate author series added entry
811	800	38	3	Conference or meeting series added entry
830	830	39	4	Uniform title series added entry
840	840	40	4	Title series added entry

Notes on Fig. 1

(1) This field is never included in a fiche record. However, if it occurs in a record being included in the on-line file, it will be included in the on-line record.

(2) This field, whenever it occurs, is always included in the corresponding fiche record. In addition, if the field occurs in a record being included in the on-line file, it will be included in the on-line record.

(3) Same as note (2). In addition, the author name in the field is extracted and converted to a term key for inclusion in the term file.

(4) Same as note (2). In addition, the title in the field is extracted and converted to a term key for inclusion in the term file.

(5) The Santa Cruz call number is cometimes followed by a subfield giving location data and other miscellaneous information. Such subfields are

not included in the fiche file or the on-line file. Thus a field such as

HV825.L36$mMultiple copies

would be stored simply as HV825.L36.

(6) The 99 field apparently occurs in every Santa Cruz record. It may contain from zero to three numbers -- an original L.C. call number, a DDC number, and an L.C. card number. The L.C. card number is the only element in this field that is included in output files. Whenever it occurs in a Santa Cruz record, it is included in the corresponding fiche record, and in the on-line record (if the record is being selected for inclusion in the on-line file).

The On-line Files

These are the basic operating files for storage of on-line bibliographic data and indexes to them, to the fiche file, and to any changes made to either. They are almost all included as subfiles at one master file, called BIBFILE. The subfiles include:

(1) A parameter subfile
(2) The citation subfile
(3) The term indexes subfile
(4) The truncated term indexes subfile
(5) The registry number index subfile
(6) The LC Card number index subfile
(7) The change record subfile

There is a separate GSLIS number index file.

In the BIBFILE, the above subfiles do not need to be in the order indicated, except that the parameter subfile should be first and the citation subfile second. The parameter subfile is to be five blocks long; all other subfiles are variable length.

The BIBFILE has a block length of 3,156 bytes, and each subfile begins in byte 1 of a block- thus each subfile occupies an integral number of blocks.

Parameter subfile

Purpose. This subfile contains data that describe or supplement the contents of the BIBFILE and are needed by the search program. This subfile is just two blocks long, and occupies the first two blocks of the bibliographic subfile.

Contents of block 1

This block is currently unused, and contains only blanks.

Contents of block 2

Bytes 1 - 150. This is an array of 50 character strings of length 3. Each is a MARC tag. A tag that is less than three digits long should be right justified with blank fill on the left. The tags should be stored in this array in the following order:

(1)	8	(18)	490	(35)	740
(2)	90	(19)	500	(36)	800
(3)	82	(20)	501	(37)	810
(4)	100	(21)	502	(38)	811
(5)	110	(22)	504	(39)	830
(6)	111	(23)	505	(40)	840
(7)	130	(24)	520	(41)	15
(8)	240	(25)	600	(42)	20
(9)	241	(26)	610	(43)	25
(10)	245	(27)	611	(44)	40
(11)	250	(28)	630	(45)	41
(12)	260	(29)	650	(46)	43
(13)	300	(30)	651	(47)	60
(14)	400	(31)	700	(48)	70
(15)	410	(32)	710	(49)	86
(16)	411	(33)	711	(50)	350
(17)	440	(34)	730		

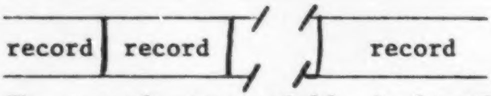
Bytes 151-153. Display mode data.

Citation subfile

Purpose. This file contains the basic bibliographic records, in a format designed for display.

Sequence. Records are in order by GSLIS record numbers.

Structure of a block



The records are variable in length. They are packed into the subfile as tightly as possible. Records may be spanned - a record may begin in one block and end in the next. Hence the first record in a block may be a continuation of a record begun in the preceding block, and the last record in a block may be continued in the following block. (A record is never spanned over more than two blocks.)

Structure of a record

Rec. len.	Line	Line	//	Line	RT	Padding

Rec. len. Fixed binary (15). The length of the record, including its own length.

Structure of a line. Each line contains (in compacted form) a separate line to be displayed on the screen. Each field (e.g., author, title) begins on a separate line. A field may require more than one line for its display. The structure of line 1 differs from the structure of the lines that follow.

Structure of line 1

Fiche data	LC card no.	Registry no.	GSLIS no.
1 - 7	8 - 16	17 - 23	

Fiche data (7 bytes)

Fiche no.	FC	FR	DC	DL

The fiche data indicate exactly where in the fiche file the record for a particular citation subfile record (CSR) begins. Fiche no. indicates which fiche contains the CSR. FC and FR indicate, respectively, the row number and column number, on the indicated fiche, of the frame that contains the CSR. DC indicates which column on the indicated frame contains the CSR. DL indicates the line on which the CSR begins within the column indicated by DC. Fiche no., FC and FR have the contents required by the Image Systems equipment being used (see below).

Fiche no. Indicates which fiche contains the CSR. 3 bytes, coded decimal.

FC (Fiche column). Indicates which column of the indicated fiche contains the frame containing the CSR. One byte.

FR (Fiche row. Indicates which row of the indicated fiche contains the frame containing the CSR. One byte.

DC (Display column). Indicates which column of the indicated frame contains the CSR. The three columns on each frame are A, B, and C, from left to right. Ergo DC is one character (A, B, or C).

DL (Display line). Indicates the line in column DC in which the CSR begins. One-byte binary.

LC card no. 9 chars., left justified with blank fill on right.

Registry no. 7 chars., right justified with zero fill on left.

GSLIS no. 8 chars., right justified with blank fill on left.

Structure of lines 2 et seq.

Code	Length	Text

Code. One-byte binary. If the line is the first line of a new field, this is the GSLIS field code for the field. If the line is a continuation of a field begun on an earlier line, the value of this field will be zero.

Length. One-byte binary. Indicates the length of the text that follows.

Text. Characters; variable length. The bibliographic text to be displayed on the line. Maximum length, 73.

Example. Suppose that the title ("title proper") of a work is *The conception of the relative ecumenical movement as reflected in the lucubrations of scholastic academicians.* This will be stored as two lines, as follows:

11	70	The conception // as reflected in the

0	39	lucubrations of scholastic academicians

RT (record terminator). One-byte binary number. Value is as follows:

252 No changes for this record are recorded.

253 Changes for this record are recorded in the unobtrusive changes subfile, but not in the permanent obtrusive changes subfile.

254 Changes are recorded in the permanent obtrusive changes subfile, but not in the unobtrusive changes subfile.

255 Changes are recorded in both the unobtrusive changes subfile and the permanent obtrusive changes subfile.

Padding. This is not present when a record is first created; it may be present after an unobtrusive change has been made to a record.

Coding of fiche data for Image systems requirements

Fiche no.	H.P.	V.P.	Col.	Line

Fiche no. 3 bytes, coded decimal, as follows:

Decimal	Code	Decimal	Code
0	@	5	E
1	A	6	F
2	B	7	G
3	C	8	H
4	D	9	I

H.P. Horizontal position (col. no.) of the frame on the fiche. 1 byte, coded as follows:

Col. no	Code	Col. no.	Code
1	0	9	8
2	1	10	9
3	2	11	:
4	3	12	;
5	4	13	<
6	5	14	=
7	6	15	>
8	7	16	?

V.P. Vertical position (row no.) of the frame on the fiche. 1 byte coded as follows:

Row	Code	Row	Code
A	0	G	6
B	1	H	7
C	2	I	8
D	3	J	9
E	4	K	:
F	5	L	;

Term indexes

Purpose. These indexes allow access to the citation subfile by term - author, title, or subject.

Master term index.

Purpose. This is a multi-level master index. Given a term key (that is , a combination of a term and a function indicator), this index enables the program to find the block of the detailed term index in which the detailed index for the given key begins.

Sequence. The records in this index are, at each level, in collating sequence order of term keys.

Structure of a block

Pointer	Record	Record	//	Record	Dummy	Padding

Records are variable in length (Maximum 260 bytes). Records are not spanned. Each block contains as many records as will fit.

Pointer. A FIXED BIN (31) number. Its value and purpose are explained under "Pointers" later in this section.

Record. Structure:

Length	Term key	Block no.

Length. One-byte binary. Indicates the length of the term key that follows.

Term code. Characters; variable length, maximum 253. Constructed as described under "Structure of term keys" in Sec. 2.3.2.

Block no. A three-byte binary number. This is the relative block number of the block in the detailed term index in which the record for the current term begins.

Dummy. Two bytes; first byte contains hex FF. A dummy is present in every block of this index.

Padding. This is present if (as will usually be the case) the combined lengths of the pointer, the records, and the dummy do not exactly equal 3,156 bytes. The value of the padding is undefined.

Pointers

The first four bytes of each block at each level of the master term index contain a fixed binary (31) number. Its value is the relative block no. of the block, at the next lowest level of the index, in which the first record in the current block would have been placed had there been room.

Detailed Term Index

Purpose. This is an inverted file; it enables an author on title to be looked up, and yields the GSLIS numbers of the records that contain the given author or title.

Sequence. Each term is followed by a one-character cole (1 for an author, 2 for a title). The records are in order by the term-code combination.

Structure of a block

Pointer	Record	Record		Record

The records are variable in length. They are packed into the index as tightly as possible. Hence a record may be spanned - it may begin in one block and end in a later one. Thus the last "record" in a block may be incomplete, being continued in the next block; the first "record" in a block may also be incomplete, being the end of a record begun in an earlier block; and indeed an entire block may be only a segment of a record that begins in an earlier block and ends in a later one.

Pointer. This (a FIXED BIN [15] number) occupies the first two bytes of every block. Its value is the byte number of the first record that begins in the block. Its value is zero if no record begins in a block. Note that every block has a pointer in its first two bytes; therefore, when a record is spanned from one block to another its continuation into the second block begins in the third byte of the second block.

Structure of a record

Len	Term key	Postings directory	Terminator

Len. One-byte binary. Indicates length of the term key that follows. Maximum value 253).

Term key. Characters; variable length, maximum length 253. For detailed structure, see "Structure of Term Keys" later in this section.

Postings directory

Entry	Entry	//	Entry

Structure of an entry.

Postings	GSLIS no.	GSLIS no.	//	GSLIS no.

Postings. One-byte binary; maximum value 255. Indicates the number of GSLIS numbers in the currect entry.

GSLIS no. Three-byte binary. Each is the GSLIS number of a different record in which the term in question occurs with the function code in question. (Function codes are explained under "Structure of Term Keys" later in this section.

Note: The postings directory is discussed further under "Structure of the postings directory" later in this section.

Terminator. One byte; hex 0 0 . It is present only if (as will seldom be the case) the last entry in the postings directory contains exactly 255 GSLIS numbers.

Structure of term keys. A term key has the following structure:

string@digit

string. This is a string of characters (minimum length 1, maximum 251) constructed from either an author name or a title, by the rules given in Sec. 3.2 of the document "Notes on the Data-Base Creation Program."

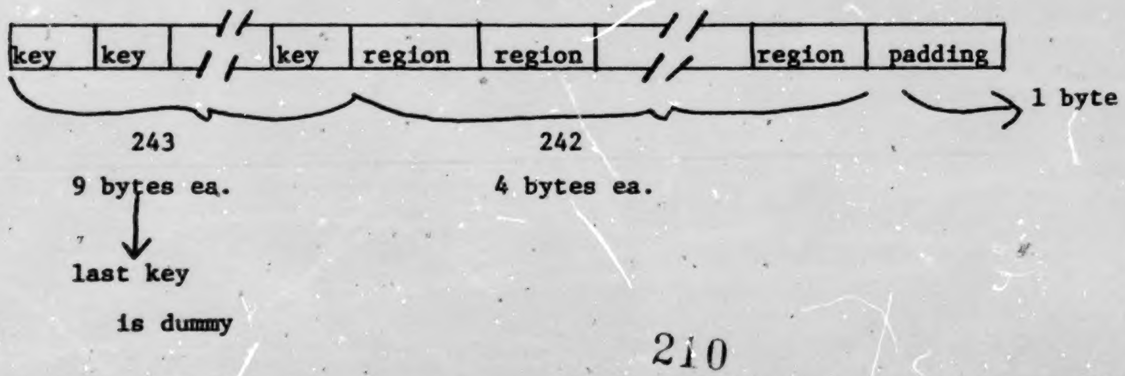
@ This is a single byte, value hex 0 0.

digit. A single character - the digit 1 if the string represents an author, the digit 2 if the string represents a title.

Notes on the postings directory. Since the one-byte binary number that begins each entry in the postings directory can have a maximum value of 255, an entry cannot contain more than 255 GSLIS numbers. Hence if a term has been assigned to more than 255 records, the postings directory must contain more than one entry. In such a case, if the number of GSLIS numbers in the postings directory is not an even multiple of 255, only the last entry should contain fewer than 255 GSLIS numbers - each of the other entries should contain a full 255 GSLIS numbers. The GSLIS numbers in the postings directory should be in ascending order.

2.4.1 Master truncated key index

Structure of a block



Detailed truncated key index

Purpose. This inverted file enables the citation subfile to be searched using OCLC-like truncated author, title, and author-title search keys.

Sequence. Each truncated key is followed by a one-character code (1 for an author key, 2 for a title key, and 3 for an author-title key). The records are in order by the key-code combination (thus, for example, the key-code combinations HOW0BLAN1, HOW0BLAN3, HOWABLAN3 would occur in that order).

Structure of a block

Pointer	Record	Record	/ /	Record

Records are variable in length, and are packed into the index as tightly as possible, as described for the detailed term index.

Pointer. A FIXED BIN (15) number. Points to the byte that is the first byte of the first complete record that begins in this block. Value is 0 if no record begins in the block.

Structure of a record

key and code	Postings directory	Terminator

Key and code. Nine characters - a truncated key (8 characters) followed by a code (one character (1 for an author key, 2 for a title key, 3 for an author-title key).

Structure of the postings directory. Exactly as in the Master term file.

Terminator. Exactly as in the Master term file.

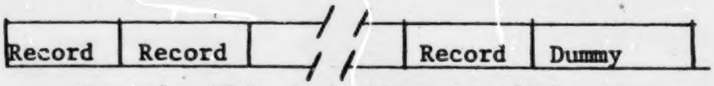
Registry number index

Purpose. Given a (supposed) Santa Cruz registry number, this index enables the program either (a) to determine that no record in the citation subfile has the given registry number, or (b) to calculate the GSLIS number of the citation subfile record that has the given registry number.

Comment. This is a multi-level index, constructed as described in Sec. 2.9 . The detailed structure of this index, and the manner of its use, are determined by the following facts: (a) Every record in the citation subfile has a registry number; (b) no two records in the citation subfile have the same registry number; (c) there is no fixed interval between the registry numbers of successive records; and (d) the records in the citation subfile are in order both by GSLIS number and registry number.

Sequence. Records in this index are in order by registry number.

Structure of a block

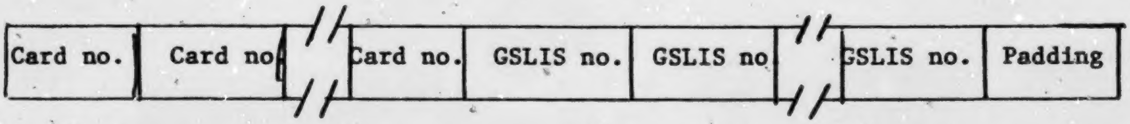


Record. This is a fixed bin (31) number - a Santa Cruz registry number.

Dummy. Also a fixed bin (31) number. Value is the largest number of this type.

Sequence. Records at each level of this index are in order by L.C. card number, as converted to a FIXED BIN (31) number. Thus, for example, the record for the card number 5-432 precedes the record for the card number 17-6489, since the former converts to the value 5,432,000 and the latter converts to the value 17,648,900.

Structure of a block



Card no. There are 451 of these. Each is a FIXED BIN (31) number. In each block (except possibly the last) the first 450 will be actual L.C. card numbers, and the last will be a "dummy" (value equal to the largest possible FIXED BIN (31) number). In the last block of this index, there will be a full 451 card number fields from none through 450 of these will contain actual L.C. card numbers, and the last of these will contain a "dummy." If the dummy occurs in the nth card numbers field, fields n + 1 through 451 will have undefined values.

GSLIS no. There are 450 of these. Each is a three-byte binary number. The first is the GSLIS number corresponding to the first card number; the second corresponds to the second card number; etc.

Padding. Two bytes; value undefined.

3.1 GSLIS record no. index

Purpose. This is the master index to the citation subfile. If the GSLIS record number of a record is known, this index indicates in which block of the bibliographic file, and at what position (byte) in that block, the citation with the desired GSLIS record number begins.

Sequence. Records in this index are in order by GSLIS record number - the nth record in this index corresponds to the nth record in the citation subfile.

Structure of a block

Record	Record	//	Record	Padding

Each block contains 631 records (except that the last block in the index may contain fewer).

Structure of a record.

Block no.	Start pos.

Block no. Three-byte binary. Absolute block no. of the block in the citation subfile in which the citation record with the desired GSLIS record number begins.

Start pos. Fixed binary (15). Indicates in which byte of the indicated block of the citation subfile the citation record with the desirec GSLIS record number begins.

Padding. This is one byte long in every block, except perhaps the last block of the index, which may contain fewer than 631 records.

Search of On-Line Files

These programs provide capabilities for processing search requests, analyzing them for syntactic correctness, looking up request components in index files (to obrain GSLIS #) finding relevant data (either fiche location or stored bibliographic data), storing changes (when that is called for), and sending data for transmission.

Process Search Requests. This routine is called by the minicomputer # under TSO. It performs the following tasks:

(1) Initialize, especially setting the highest level of entry into the various indexes.

(2) Read a batch of transmissions from the minicomputer. These can be either a batch of requests or a batch of changes.

(3) If the transmissions are requests, each is processed in turn. This involves a series of steps:

- The request is scanned and checked for syntactic correctness
- The request is reformatted as a Polish string
- Each value in the Polish string is looked up in the indexes.
- Each operator in the Polish string calls up the associated functional routine
- The output of processing is a set of GSLIS #, identifying each hit in the bibliographic file, the permanent change file, and the temporary change file. (The difference between a permanent change and a temporary change will be discussed below.)

(4) If the transmission is a batch of (one or more) changes, each is processed in turn, as follows:

- The first two bytes of the change are examined. If they are "∼+" (i.e., NOT PLUS), the change will be treated as a "permenent change" which thereafter will not be eliminated in a SETUP (see below for discussion of SETUP). Otherwise, it is treated as a "temporary change".
- The change text, verbatim as transmitted, is then stored in the appropriate change file.
- The GSLIS # index file is updated to include an entry to the changes.

Transmit Search Results. This routine then performs the following tasks:

(1) Connect with CNCT (the program in minicomputer) through NSAM.

(2) Transmit results of Process Search Requests.

(3) Check transmission, and if errors occur either retransmit or if unrecoverable errors occur, abort.

(4) Disconnect.

SET-UP

The "set-up" program is a small one that is used to establish conditions of experimentation. It permits the experimenter to set conditions with respect to three aspects of operation:

(1) What percentage of retrieved data is to represent fiche data and what percentage on-line digital data? This can vary from 100% fiche to 100% digital, expressed as percentage fiche (from 100% to 00%).

(2) How many "hits" are to be transmitted in response to a single request?

(3) Are changes made in the past to be retained or eliminated?

The program is called under TSO, through use of the terminal connected directly to the central campus facility, as follows: After LOGON to TSO:

```
READY:  exec  setup
```

A succession of screens is then presented.

Fiche Production

Fiche production was handled through a commercial contractor. The only requirment was delivery of an IBM print format tape with the data arranged in the format desired.

THE USE OF AN ON-LINE MICROFICHE CATALOG
FOR TECHNICAL SERVICE AND RETRIEVAL OF BIBLIOGRAPHIC DATA
Section V. Cost/Effectiveness Evaluation

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1 April 1979

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1. Introduction and Summary

In this section of the Report, we present the plans and results of operational test of the configuration of equipment (i.e., of the combination of a central computer, a distributed minicomputer and a distributed microform file). First, a cost analysis is presented of the comparison of fiche display with all digital display, including a cost model, data derived from operational tests, and a projection of those data in the cost model under various representative situations.

Then, various applications of the system are discussed, together with plans for functional test. The data base selected for on-line storage was chosen based on an identified set of cataloging exercises, so these are presented in detail.

2. Cost Analysis - Fiche vs. Digital

The fundamental issue on which this project was based was whether a distributed microfiche file would be less expensive than a central digital file for comparable functions. The preliminary analysis, based on data that was either hypothetical or drawn from operational experience in other contexts, implied that it would be, at least, under a broad range of conditions.

In this sub-section, we provide an analysis of costs based on data derived from the experimental operation itself. To do so, we first establish a cost model in parametric form, so that alternative contexts can be evaluated and so that data based on other than the experimental operation can be considered.

Then we present the data from tests of costs and timing. Finally, we project those data into a range of representative contexts. We will define the costs associated with these two alternative systems in two main categories: common costs (those that are independent of choice of system) and system dependent costs. For each cost component, we will assign an "index number" that will be used for referral to them in subsequent tabulations.

Common Costs. Certain costs are common to either alternative. That is, they are the same, or so nearly so that they can be so treated, whether we are dealing with fiche display or all digital display.

(1) Request input time. Under either alternative, the user must input requests. The time required to do so is assumed to be independent of choice of alternative. Of course, it is dependent upon the nature of the processing programs, the functional capabilities, and the sequence of operations for request input.

In the test environment, a variety of means are provided for formulation of requests: various search criteria (author codes, title codes, author-title codes, LC card numbers, registry numbers, and file numbers), the full set of boolean connectives, the use of parentheses, the ability to view a request and add to it or change it. Other operational situations may provide different sets of capabilities.

In the same vein, the test environment uses a specific set of equipment (the Honeywell Level 6 and its associated dishette files and CRT display), and a specific software package developed for the test. The request input time is therefore a function of that configuration of equipment, its operating speeds and the program running times. Other operational situations may provide different times.

There are a number of extraneous variables that are clearly independent of the choice between the two alternatives of interest: the speed of the person inputting requests, the accuracy of data input, the effect of environmental conditions.

(2) Request transmission time and Related Costs. This function is clearly independent of the form of subsequent display. However, it was not feasible to separate it out of the total processing cycle. It is therefore included in the data reported for "connect time" in communication (see index number 11).

(3) Connect time for CPU Processing. It is not clear to what extent this time may differ between the two alternatives, although the data presented later suggests that, if there are differences, the time for dealing with a fiche index will be less than that for dealing with a fully digital file. However, for purposes of this analysis, it is assumed that the two times are the same.

CPU time shows up in two ways: first, as actual seconds of time and, second, as reported time (MUS, or machine unit seconds) on which costs are based. The former could not easily be separated out of the total processing cycle. It is therefore included in the data reported for "connect time" (See index 11).

(4) CPU Charges for MUS. The latter however is separately reported (as MUS, or machine unit seconds, and as associated dollars, at $0.10/MUS). Those costs are therefore included in the category of "common costs."

(5) Operator Decision Making Time and Related Costs. Under either alternative, the operator must make decisions based upon the displayed data. To an extent, that time is affected by the form of display, so a category of "viewing time" is included separately. However, the presumably much larger and function-related time to check other files, to compare with the displayed data, to make decisions, is clearly independent of the form of display.

Since this "decision-making time" is totally function dependent and not related to the choice between alternatives, no effort was made to estimate it.

(6) Other Operator Time and Related Costs. Other operator time, whether overhead time, paper handling time, review of requests, etc., is also clearly independent of the choice between alternatives. No effort was made to estimate it.

(7) On-line index storage costs. In both alternatives, a variety of indexes must be stored at the central computer facility. They provide pointers to the location of data in either the on-line digital file or the fiche file. The storage required is independent (or so nearly so that the difference is immaterial) of the choice of alternative. It is a function of the variety of index entries provided, of course.

(8) Digital Terminal Costs. In each of the alternatives being here considered, it is assumed that digital terminals will be installed at each unit, both for technical service and, librarian operated, for reader service. The costs of these terminals are a function of the capabilities they provide.

(9) Non-terminal Access. In each of the alternatives being here considered, it is possible to provide means of access to bibliographic data without use of digital terminals. The most obvious example of such access is to microform catalogs by the using public, but other examples can be visualized for both technical service and reader service.

(10) Additions to and Changes of Entries for the Basic File. In either of the two alternatives, periodic (e.g., monthly) additions will be made to the basic file. Costs will be incurred in processing them and adding entries to indexes.

System Related Costs. There are several cost variables in which the two alternatives differ.

(11) Communication & Processing Connect Time Costs. These costs represent a mix of times that are independent of alternatives (i.e., communication of requests and processing of them at the central computer system) and those that are dependent on the alternative (e.g., communication of responses). These are all lumped together because the means for data acquisition did not provide a separation of the related connect time costs.

(12) Display Connect Time. The two alternatives differ appreciably in the time required to display retrieved data. These times affect the connect time costs, and data was acquired specifically for them.

(13) Viewing Connect Time. Since the digital alternative involves only one display and the fiche alternative two, there may in principle be differences in the time required to view and interpret the data presented. Preliminary data was obtained on the respective times.

(14) Basic File Storage Costs. This cost is a function of the number of entries in the file. The two alternatives differ significantly, of course, since there is no on-line storage of the basic file in the CARD system alternative.

(15) Storage of Additions & Changes. Additions and changes to the file must be stored on line in both alternatives, but the two alternatives differ in the time required. The digital system requires permanent storage; the fiche system requires storage only until the periodic update of the fiche files.

(16) Update of Fiche Master Costs. These costs arise in the CARD system as a result of periodic re-issue of updated master file microfiche. The costs identified here are those related to production of the master microfiche.

(17) Production of Fiche Copies Costs. These costs arise in the CARD system as a result of distribution of fiche files. They involve costs of copying and of attaching edge-notched "clips", used in CARD device retrieval.

(18) CARD Terminal Unit Costs. These costs, of course, arise only in the CARD system. They include both the cost of the CARD unit itself and maintenance of it.

Relevant Parameters & Variables

In discussing the several components of cost and timing, we will relate them to various parameters that describe the context within which bibliographic systems function and various variables that characterize the alternative systems. In this subsection, we will summarize those parameters and variables.

Parameters of Context. The parameters of context describe the characteristics of the workload placed on the system.

V, Transactions per Month. The volume, V, of transactions during a given time period is the first parameter. The time period will be taken as one month, since it is a convenient unit, the smallest on which cost data is usually presented.

N, Entries in Basic File. The number, N, (expressed in 1000's) of entries in the basic bibliographic file is the second parameter. This measure is the most representative of those related to file size. (others might be number of characters, number of titles, etc.).

C, Changes & Additions per month. This parameter represents the growth rate, C, in the basic file.

T, Months per Update. This parameter relates to those alternatives in which a microform copy of the basic bibliographic file is produced, for both technical services and reader services, including perhaps public access. In such cases, the file must be updated and re-issued periodically. In some cases, the period is one month; in some, a number of months; in this analysis, one year.

M, Number of Terminals. This parameter identifies the number, M, of terminals which can communicate with central on-line data bases, including those used for technical services and for reader services, under operation of a librarian. (In this analysis, it is assumed that, for the next several years public access will not be through direct access to on-line data bases.)

A, Existence of Non-terminal Access. This is a binary parameter, representing a decision concerning the production and distribution of bibliographic data, presumably in microform, for access through means other than terminals. If this parameter is "0", there is no such distribution; if it is "1", there is such distribution.

Variables of Cost in Operation. In the following model, we will utilize variables descriptive of the cost of operation of alternative systems:

Connect Time Cost. This variable represents the charges for equipment used, allocated on the basis of the time they are used. The equipment involved includes central processing connect time at $4 per hour, communication line charges, (at no cost since there is a direct connection), and a proportionate share of the local mini-computer, at $2 per hour. The total is therefore $6 per hour of connect time.

On-line Storage Cost. This variable covers the cost of on-line disk storage, the disk handler, the controller and communication buffer. These charges are a function of the kind of disk storage equipment used, the amount of time that they must be on-line, the percentage of capacity used. In the experimental configuration, using

IBM 3330 disk units and a total storage of 2,931 K bytes, the monthly charge is $147 (i.e., $.05/month/1000 bytes). However, the system is soon to be replaced by one for which charges will be about $ .02/month/1000 bytes, and alternative disk units are available that would reduce that cost to $ .01/month/1000 bytes. The figure of $ .01 will be used in subsequent analyses.

Card Unit Costs. One of the alternatives being considered specifically includes an Image Systems Compucard unit. The purchase price of the unit actually acquired, including capability for connection to a computer but not including capability for producing hard copy, was $10,547 (tax included). It is most convenient to represent this cost as a monthly charge, based on amortizing the purchase price over an appropriate time interval. Taking the amortization period as 60 months results in a monthly cost of $175; maintenance contract costs are $55/month; the total of $230 will be used in subsequent sections.

Master Fiche Production Costs. The production of master fiche is an essential cost in the microfiche system alternative; it is a cost in either alternative if non-terminal, fiche access is to be provided. The costs for production of master fiche include:

(1) Production of print format tape
(2) COM production of master fiche.

In the experimental system, the production of the print format tape was combined with the process of creating the master on-line file, since it was necessary that the on-line file include fiche entry locators as well as selected bibliographic records stored in digital form. It is therefore not possible directly to separate the costs for the two processes. The charge for the total run was $1500. It is estimated the cost for establishing the full on-line file is about $ .20 per entry; for the 5256 records stored the estimated cost would be $1052. The remaining is thus the estimated cost for production of the print format tape containing 288,110 entries, or a cost of $1.70 per 1000 entries.

The cost for COM production of the master fiche, on the other hand, was separately contracted. The quoted price schedule is $1.00 per fiche, but for a small, one-time run, there were additional set-up costs. The total price was therefore $127.60 for the 1107 master fiche. Since a fiche contains about 3000 entries, the cost per fiche master is between $ .33 and .40 per 1000 entries. We will use the figure of $ .40 in subsequent analyses.

Fiche Copy Costs. Two kinds of fiche copies may be produced: those for use in the CARD unit and those for use at non-terminal access points.The former must be on heavy, 7 mm. base stock, and must be "clipped" (the clips are edge-notched code strips that are the means for selection of desired fiche by the CARD unit.)

The quoted cost for producing fiche copies is $0.10 per fiche; the cost of clips is $0.25 per fiche; the total cost is thus $0.35 per fiche, or $0.12 per 1000 entries. However, Image Systems was asked to do the clipping itself, so an added labor cost brought the charge to $0.60 per fiche or $0.20 per 1000 entries. The cost of fiche for use at non-terminal access points would be simply the $0.10 per fiche costs of copying.

Cost Model

We are now ready to summarize the several cost components, relevant parameters, and variables into a single cost equation.

Index i	Component Cost	Parameter	Variable	Cost
1	Request input time	$P_1=V$	T_1	C_1
2	Request transmission (Sec 11)			
3	CPU Connect time (Sec 11)			
4	CPU MUS	$P_4=V$	T_4	C_4
5	Decision Making Time	$P_5=V$	T_5	$C_5=C_1$
6	Other Operator Time	$P_6=V$	T_6	$C_6=C_1$
7	On Line Index Storage	$P_7=N$	T_7	C_7
8	Digital Terminals	$P_8=M$	T_8	C_8
9	Non-terminal Access	$P_9=A$	T_9	C_9
10	Processing additions and Changes	$P_{10}=C$	T_{10}	C_{10}
11	Communication Connect Time	$P_{11}=V$	T_{11}	$C_{11}=C_1$
12	Display Time	$P_{12}=V$	T_{12}	$C_{12}=C_1$
13	Viewing Time	$P_{13}=V$	T_{13}	$C_{13}=C_1$
14	On-line Storage, Basic File	$P_{14}=N$	T_{14}	$C_{14}=C_7$
15	On-line Storage, Changes	$P_{15}=CT/2$	T_{15}	$C_{15}=C_7$
16	Fiche Master Creation	$P_{16}=N/T$	T_{16}	C_{16}
17	Fiche Copies	$P_{17}=MN/T$	T_{17}	C_{17}
18	CARD Units	$P_{18}=M$	T_{18}	C_{18}

The cost equation then has the form

$$C = \sum_{i=1}^{18} P_i \, T_i \, C_i$$

The parameters, P_i, characterize the organizational context; the variables, T_i, measure the performance of alternative systems; the costs, C_i, are independent of either the context or the choice of system, representing charges or costs per unit of utilization.

Cost and Timing Data

The purpose of the experiments, aside from demonstrating feasibility, was to provide actual operational data on costs and times. In this sub-section we will summarize the results obtained.

Index	Fiche	Digital	Cost	Notes
1	20 sec	20 sec	.00167	1, 2
2				3
3				3
4	2 mus	2 mus	.10	4, 5
5				6
6				6
7	400x.15	400x.15	.01	7, 8, 9
8			66.	10
9				6
10	400	400	.20	7, 11
11	51.7 sec	72.6 sec	.00167	12, 2
12	6.5 sec	2.5 sec	.00167	13,2
13	15.0 sec	10.0 sec	.00167	14, 2
14	0	400.	.01	7, 9
15	400.	400.	.01	7, 9
16	1	A	2.10	16
17	1	0	.20	17
18	1	0	230.	18,19

Notes

(1) The estimate of input typing time is based on input of 100 requests of varying length and complexity.

(2) The estimate of cost C_1 is based on $6/hr. of connect time charges (the established rate for connect time to the central campus facility is $4/hr; the prorated charge for the school's minicomputer is taken at $2/hr based on 60 month amortization of $24,000 at 200 hours per month). That converts to $6/3600 = $ .00167/sec.

(3) The data for communication connect time (index 11) includes this time.

(4) A set of 317 requests were processed; 150 involved fiche data and 167 involved all digital data. They were of varying complexity (although identical for parallel fiche and digital contexts), and varying degrees of batching. The MUS varied from 1.24 for requests of least complexity

to 5.25 for those of greatest complexity. The differences between fiche and digital responses were sizeable (1.78 average for fiche vs. 2.40 for digital), but the variation is great enough to preclude assuming a difference. We therefore take this value at the average of 2 sec .

(5) The established rate per MUS is $0.10.

(6) No data was acquired in these tests for these cost components.

(7) The average number of characters per entry in the on-line bibliographic file was 406 bytes, which is taken here as 400.

(8) The on-line bibliographic file totalled 2,131,053 bytes. The basic indexes (by author code, title code, author-title code, LC card number, registry number) totalled 321,504 - almost exactly 15% of the bibliographic file size.

(9) Actual charges during the experiments were at the rate of $ .05/month/1000 bytes. New equipment, to be installed this summer will reduce that to $ .02/month/1000 bytes. However, this cost value so drastically affects the total cost for the digital system that the figure of $ .01/month/1000 bytes, which is obtainable in principle, will be used.

(10) The cost of terminals varies widely, but the OCLC terminal recently acquired by the School (no discounts involved) cost $3948 (including the modern). With a 60 month amortization, the monthly cost is $66.

(11) It is estimated that the cost per entry for addition to an on-line master file is about $0.20.

(12) The set of 317 requests were transmitted, searched, and data returned; 150 involved fiche data and 167 involved digital data. They were submitted at times of varying workload on the central processing unit(from a low, early Saturday morning, to peaks during weekday afternoons). The digital and fiche returns were intermixed, so as to assure that they were equally affected by workload. The connect time was measured, by a stop watch, from initiation of transmission to completion of returns of data, ready for display. Times varied as shown in the following table.

Experiments in Searching Connect Time

Experiment	Description	Fiche			Digital		
		N	Avg	S.D.	N	Avg	S.D.
A	Single request, 1 hit	10	53.2	13.6	10	70.2	18.8
	3 charges	10	74.7	15.5	10	152.1	27.0
B	Single request, 5 hits	10	46.2	11.3	10	77.4	7.9
		10	50.2	9.4	10	81.5	16.6
C	Single request, 1 hit	17	22.0	-	17	34.5	-
		10	28.5	3.0	10	32.3	5.2
		10	25.1	2.4	10	33.6	6.2
					10	37.5	8.5
D	Single request, 5 hits	10	44.1	6.3	10	124.5	13.7
	7 charges	10	52.2	14.6	3	165.7	5.6
		10	106.2	18.9	8	160.9	16.8
		10	105.8	13.2	10	146.0	58.6
E	Single request, 1 hit	12	26.3	5.2	10	42.2	9.3
	1 charge	10	30.3	6.2	10	50.8	9.2
		10	45.5	11.1	10	57.9	15.9
		10	44.2	11.3	10	70.5	15.5
	Total	150	51.7		167	72.6	

The average for fiche data was 51.7 seconds, for digital data 72.6 seconds.

(13) A series of tests was run on the respective times required to display data in fiche form and digital form. The variation from one test to the next was less than .25 second and rarely differed by as much as .1 seconds from the values shown.

(14) The values shown are estimates based on very limited timing tests.

(15) The value for A is determined by whether the production of fiche is required in the digital system for distribution to non-terminal access points.

(16) The cost for fiche creation is the cost of processing (at $1.70 per 1000 entries) plus the cost of COM output (at $0.40 per 1000 entries), or $2.10.

(17) [illegible] cost of fiche copies, with clips, is $0.60 per fiche or $0.20 per 1000 entries.

(18) The amortized cost of a CARD unit over 60 months is \$175; maintenance at \$55 per month brings the total to \$230.

(19) The on-line capacity of the CARD unit is a significant boundary condition. Although it is possible to utilize replacable cartridges that, in principle, give an unlimited capacity, doing so involves an entirely new set of procedures and associated times. In the subsequent representative calculations, therefore, the size of files will be limited to the on-line capacity with automatic access. In the experimental operation, each fiche averaged about 3000 entries. For the full capacity of 750 fiche, the maximum number of entries would be 2,250,000. At 48X reduction, instead of the 42X actually used, the capacity would be about 30% more; at a denser recording of COM output, it could be even more than that. For purposes of this analysis, however, the limit will be taken at 2,000,000 entries.

Representative Calculations

The values for the parameters can now be chosen to describe several representative contexts:

Parameters	Small Library	Large Library	Small System	Large System
V	1000/mo	10,000/mo	10,000/mo	30,000/mo
N(K)	150(K)	1,000(K)	1,000(K)	2,000(K)
M	1	5	10	30
C(K)	1(K)/mo	3(K)/mo	5(K)/mo	10(K)/mo
T	12 mos.	12 mos.	12 mos.	12 mos.
A	(NO) 0	(NO) 0	(NO) 0	(NO) o

If these values are used in the cost equation,

$$c = \sum_{i=1}^{18} P_i T_i C_i ,$$

we will have a basis for comparison of the two alternatives - fiche vs. digital - in each context.

Index	Component	P	V	C	Small Library	Large Library	Small System	Large System
	Fiche System							
1	Input Requests	V	20	.00167	33.	333	333	1000
4	CPU Usage	V	2	.10	200.	2000	2000	6000
7	Index Storage	N	6	.01	9.	60	60	120
8	Digital Terminals	M	1	66.	66	330	660	1980
10	Process Additions	C(x)	1	.20	200	600	1000	2000
11	Communication	V	51.7	.00167	86	860	860	2590
12	Display	V	6.5	.00167	11	108	108	325
13	Viewing	V	15.0	.00167	25	250	250	750
15	Store Additions	CT/2	400	.01	24	72	120	240
16	Create Fiche	N/T	1	2.10	26	175	175	350
17	Copy Fiche	MN/T	1	.20	3	83	166	1000
18	Card Units	M	1	230	230	1150	2300	6900
	Total				913	6021	8932	23255
	Avg.	V			.91	.60	.80	.78
	Digital System							
1	Input Requests	V	20	.00167	33	333	333	1000
4	CPU Usage	V	2	.10	200	2000	2000	6000
7	Index Storage	N	6	.01	9	60	60	120
8	Digital Terminals	M	1	66.	66	330	660	1980
10	Process Additions	C	1	.20	200	600	1000	2000
11	Communication	V	72.6	.00167	121	1212	1212	3637
12	Display	V	2.5	.00167	4	42	42	125
13	Viewing	V	10.0	.00167	17	167	167	500
14	File Storage	N	400	.01	600	4000	4000	8000
15	Store Additions	6C	400	.01	24	72	120	240
	Total				1274	8816	9594	23602
	Avg.	V			1.27	.88	.96	.79

Commentary

Even these representative examples permit one to see how the several components of cost affect the choice of system. The most evident issue is the relative cost of the basic fiche storage versus on-line storage.

In terms of the aims of this project, the initial hypothesis (that the fiche alternative would be less expensive over a range of context, assuming the functional operations were comparable) has been confirmed with actual data from experimental operations. The crucial variables in evaluating the decision have been evaluated in a variety of operational modes.

3. Effectiveness Analysis

In this subsection, we will describe the experiments planned to test the relative effectiveness of fiche display vs. on-line digital display. These experiments have not yet been conducted, so the description of them is still hypothetical, and there are no experimental data to present. However, the on-line data base has been established with these experiments in mind and the fiche file contains the entire registry catalog required for the experiments. All programs and procedures are fully operational.

Before discussing the planned experiments, there is some value in placing them in the context of various possible applications of the alternative systems.

Operational Applications

There are several operational applications for which the choice between the two alternatives is meaningful:

Cataloging Operations. This is the most obvious exapmple, since it lies at the core of bibliographical processing. It is the application for which the experiments are designed.

Authority File Operations. This function clearly relates to cataloging, but the files and operations are fundamentally different.

In-Process File Operations. This is an application area of special importance and immediate payoff for the individual library.

Serial Records Operations. Both union lists of serials and single library serials processing are areas to which bibliographical systems are applicable.

Indexing & Abstracting Service Operations. These represent natural extensions of the cataloging and authority file kinds of applications.

Experiments: Cataloging

The objectives of the effectiveness evaluation is to provide concrete and specific answers to the two questions:

- Is the use of on-line microform catalogs operationally feasible in comparison with other alternatives?
- Is it technically feasible?

To answer those questions involves the creation of three sets of files:

(1) digital bibliographic records
(2) microfiche bibliographic records
(3) digital indexes to bibliographic records in both digital form and microform

In this sub-section, we identify tasks to be used in experiments to determine the effectiveness of three modes of operations: on-line digital, on-line access to microfiche, and off-line fiche. The experiments include cataloging or bibliographic functions to be covered and titles used to test these functions.

The tasks involved in these experiments would normally be performed by clerical staff working in a technical services area of a library. We feel that the tasks are typical of those performed in a library where the acquiring and cataloging of books would necessitate using a catalog of the library's holdings.

For the experiments the following indexes are provided with which to work:

(1) Name (Authors : personal and corporate names
(2) Title words excluding those on a "Stop List," in the form of OCLC title codes using 3,2,2,1 letters from the first four significant words of a title.
(3) OCLC author/title codes, using the first four letters of each.
(4) Library of Congress card number.
(5) Registry number (accession number).

The University of California at Santa Cruz (UCSC) Registry Catalog forms the on-line microfiche catalog. While the digital and microfiche records and indexes were created from the magnetic tapes of the catalog, the experiments were devised using the printed form of the catalog, which is an author/title/series catalog. There are no subject headings or L.C. card numbers in this printed catalog, although they are included on the magnetic tapes. There appear to be title entries for all books, including those beginning with generic names, but uniform titles for works of known authorship are not used.

We want to emphasize that in devising these experiments we were limited by the nature of the UCSC Book Catalog, the types of indexes that will be provided, and the lack of certain files that are normally available to the technical services staff of a library. The files that we lack and which impose definite restrictions on the type of task included in the experiments are the following:

(1) Subject Authority File.
(2) Name Authority File.
(3) Series Authority File.
(4) In-Process File.
(5) Shelf List File.

Examples of bibliographic functions that could not be done realistically without one or more of the above files are verifying whether a library uses a particular subject heading or clearing up discrepancies in the form of the subject heading (need Subject Authority File) and verifying whether a library makes added entries for a particular series or the exact form of the series added entry (need Series Authority File). Also most acquisitions' decisions involve checking an In-Process File to see if an item has been ordered already.

While being aware of these limitations and assuming there are no errors in the data base, we developed six experimental tasks which are described in detail in this section.

Some of the experiments, for example I and II, were designed to test the relative efficiency of storing indexes on-line or on microform. Our choice of entries should test whether certain types of titles and authors will be found more quickly using the microfiche, either the indexes or the bibliographic records.

These six experiments are straight forward. There is no erroneous information or trick questions included in these tasks.

I. We have an order form for a book. We want to find out if the book is already in the collection. This is an example of those instances when we elect to search an item by title because that is all we know or some aspect of the author's name is ambiguous. The rationale for this experiment is that searching with a title citation is a typical library task. Also, because of the title being used, it will focus on the problem of searching through many columns of the same name.

TITLE: Shakespeare's Library

RESULT: The title will be found

UCSC Book Catalog Information:

(1) On page 12017 under Shakespeare's Library there is a see reference to "Hazlitt, William Carew, 1834-1913."

(2) There are 3 pages of entries beginning with "Shakespeare's..." (pp. 12016-12018).

(3) There are 15 pages of entries beginning with "Shakespeare..." (pp. 12005-12019).

(4) There are 2 pages of entries beginning with "Hazlitt..." (pp. 5832-5834).

(5) There is 1 page of entries beginning with "Hazlitt, William Carew, 1834-1913" (pp. 5833-5834)/

(6) There are 2 columns (3 columns to a page) of entries beginning with "Hazlitt, William Carew, 1778-1830" (pp. 5832-5833).

(7) The main entry for Shakespeare's Library is under "Hazlitt, William Carew, 1834-1913 " on page 5834, about 1/3 down the 1st column.

On-Line Microfiche Catalog Requirements:

For experiment I the following are needed:

1 column of entries beginning with "Shakespeare's..." including the title entry for this book.

5 columns of entries beginning with "Hazlitt..." including the main entry for this book.

II. We have order forms for two books; both are proceedings from conferences. We want to find out if either book is in the collection. This is an example of a difficult, but not uncommon search, when we have the papers or proceedings from a conference whose title does not begin with distinctive words. In cases like this the searcher may not know how to look under the name of the conference , congress, or institute, if he even has a name.

TITLES: (1) Proceedings of the Pacific Computer Conference
(2) Proceedings of the Conference on Federal and Private Foundation Programs in Support of Higher Education.

RESULTS: Title (1) will be found.
Title (2) will not be found.

UCSC Book Catalog Information:

(1) The main entry for title 1 is one p. 9965 under "Pacific Computer Conference."

(2) There are 10 pages of entries beginning with "Proceedings..." (pp. 10700-10709).

(3) There are 24 pages of entries beginning with "Conference..." (pp. 2850-2873)/

(4) Although title 2 will not be found, if it was, it would be on page 2855 and the main entry and description would be as follows:

Conference on Federal and Private Foundation Programs in Support of Higher Education, San Francisco, 1972.

Proceedings of the conference on federal and private foundation programs in support of higher education/sponsored by Office of the Chancellor; California State College, Sonoma. -- Los Angeles: Office of the Chancellor, the California State University and College, .972.

On-Line Microfiche Catalog Requirements:

We will need the following data for experiment II:

1 column of entries beginning with "Pacific..." including the main entry for title 1 which is found on page 9965.

2 columns of entries beginning with "Proceedings..." including the sections where Title 1 is located and Title 2 would be located.

III. We have a book in hand from the Gifts Department. First we want to check and see what works by the author are in the library's collection. Second we want to find out whether this particular book is already in the collection. This is an example of those cases when we search with just the information found on the title page. It also shows a personal name main entry whose form requires many cross-references.

TITLE: The Poems of Saint John of the Cross (see attached xerox copy of title page).

RESULT: The title will be found.

UCSC Book Catalog Information:

(1) The main entry for this book will be found on page 7046 and it is in the following form:

Juan de la Cruz, Saint, 1542-1591.

The poems of Saint John of the Cross. English versions and introduction by Willis Barnstone. Bilingual ed. Bloomington, Indiana. University Press, 1968. 124 p. English and Spanish. Bibliography: p. 123-124.

(2) There is about 1 column of entries beginning with "Juan de la Cruz, Saint, 1542-1591". (p. 7046-7047).

(3) There is a cross-reference on p. 6936:
"JOHN OF THE CROSS, SAINT
see Juan de la Cruz, Saint, 1542-1591."

(4) There are no entries or cross-references for "Saint Juan de la Cruz."

(5) There is no cross-reference from "Saint John of the Cross" to "Juan de la Cruz, Saint, 1542-1591."

(6) There are 7 pages of entries beginning with "Saint..." (pp. 11568-11574).

(7) There are 5 pages of entries beginning with "de la..." (pp. 3324-3328). The section begins with a note on how to file names beginning with "de la". Half-way down the 1st column on page 3324 there is the following cross-reference:
"DE LA CRUZ, JUAN, SAINT.
See Juan de la Cruz, Saint, 1542-1591.

THE POEMS OF SAINT JOHN OF THE CROSS

English
Versions
and
Introduction
by
Willis
Barnstone

INDIANA UNIVERSITY PRESS BLOOMINGTON AND LONDON

*For their many helpful suggestions,
my thanks to José Donoso,
Ruth Stone, Robert and Brenda
Schildgen, and Norma Grasso.*

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exception to this prohibition.

Library of Congress catalog
card number: 68-14597
Manufactured in
the United States of America

(8) There are 8 pages of entries beginning with "la..." (pp. 7468-7475). The section begins with a note on how to file names beginning with "la." On the bottom of the 1st column of page 7469 is the following see reference:

"LA CRUZ, JUAN DE, SAINT
see Juan de la Cruz, Saint, 1542-1591."

(9) There are 9 pages of entries beginning with "Poems..." (pp. 10437-10446). There is a cross-reference from "Poems of Saint John of the Cross" to "Juan de la Cruz, Saint, 1542-1591."

(10) Unlike most catalogs made in accordance with ALA rules, the UCSC Book Catalog has entries for titles beginning with generic names.

On-Line Microfiche Catalog Requirements:

For this experiment the following are needed:

1 column of entries beginning with "Juan de la Cruz..." including all entries for this author.

2 columns of entries beginning with "Poems..." including the title entry for this book.

2 columns of entries beginning with "Saint..."

1 column of entries beginning with "John..." including the cross-reference from "JOHN OF THE CROSS, SAINT" to "Juan de la Cruz, Saint, 1542-1591."

1 column of entries beginning with "de la..." including the cross-reference from "DE LA CRUZ, JUAN, SAINT" to "Juan de la Cruz, Saint, 1542-1591."

1 column of entries beginning "la..." including the cross-reference from "LA CRUZ, JUAN DE, SAINT" to "Juan de la Cruz, Saint, 1542-1591."

IV. We have an announcement from Library of Congress Processing Department. Cataloging Service. Bulletin no. 122, Summer 1977, p. 7, that the form of a heading has been changed. We want to check the catalog to find out if we have any entries under either the old or new form of entry. This is a timely experiment because of Library of Congress's abandonment of superimposition. Library of Congress began its policy of superimposition in the beginning of 1967. According to Library of Congress Processing

Department, Cataloging Service. Bulletin 79, January 1967, p. 1, superimposition "means that the rules for choice of entry will be applied only to works that are new to the Library and that the rules for headings will be applied only to persons and corporate bodies that are being established for the first time." Whether a library has a policy of superimposition or desuperimposition this kind of task is typical. Depending on its policy it will want to recatalog certain works or make the appropriate cross-references between former and revised forms of headings.

FORMER HEADING: Alberta. University. Edmonton. Faculty of Edmonton.
REVISED HEADING: University of Alberta. Faculty of Edmonton.
RESULTS: There is 1 entry under the old heading. There are no entries under the new heading.
UCSC Book Catalog Information:

(1) The 1 entry under the former heading is on the top of the 3rd column on page 209.
(2) There are 7 pages of entries beginning with "University..." (pp. 13912-13918).

On-Line Microfiche Catalog Requirements:

1 column of entries that include the former heading.
3 columns of entries of entries beginning with "University..." including the section where the revised heading would be filed.

V. We want to search by Library of Congress card number to find out if we have either of two books in the collection. This is an example of how the L.C. card number can be used to locate a book in the catalog.

L.C. CARD NUMBERS/TITLES:

(1) 77-8232 - An Exaltation of Larks by James Lipton, c1977.
(2) 76-186494 - The Descent of Woman by Elaine Morgan, c1972.

RESULTS: The first L.C. card number will not be found.
The second L.C. card number will be found.

UCSC Book Catalog Information:

(1) An earlier edition of An Exaltation of Larks is in the catalog on page 10443 in the middle column under Lipton, James.

On-Line Microfiche Catalog Requirements:

1 column of the catalog that includes the entry for The Descent of Woman which is under Morgan, Elaine on page 9082.

1 column of the catalog that includes the earlier edition of An Exaltation of Larks on page 10443.

VI. We want to search using the OCLC Author/Title Code to see what editions of two books we have. This is a typical task because libraries often want to find out what editions of a work are already in the collection. The lack of uniform titles for works of known authorship in the UCSC Book Catalog makes this search potentially difficult.

Theoretically the fastest way to determine what editions of these two works are in the library's collection is to use the Author/Title search key. But if this method fails we have made provisions for alternative search strategies, specifically, author or title searches.

This experiment shows the limitations of a search key that requires the user to know the exact title and author's name. It also points out the difficulties of searching for books written by authors who use pseudonyms.

TITLES: Tom Sawyer by Mark Twain
Huckleberry Finn by Samuel Clemens

RESULTS: There are editions of both in the catalog but they will not be found if the following OCLC search keys are used:
TWAI/TOM
CLEM/HUCK

UCSC Book Catalog Information:

(1) There is a cross-reference from "Twain, Mark" to "Clemens, Samuel Langhorne, 1835-1910" on the top of the right column on page 13502.

(2) There are 3 pages of entries for "Clemens, Samuel Langhorne, 1835-1910." (pp. 2613-2615).

(3) There are entries for:
2 editions of The Adventures of Huckleberry Finn.
3 editions of The Adventures of Tom Sawyer.
1 edition of The Adventures of Tom Sawyer and Huckleberry Finn.

(4) In the middle column of page 115 there are:

2 title entries for "The adventures of Huckleberry Finn."

1 cross-reference from "ADVENTURES OF HUCKLEBERRY FINN" to "The adventures of Tom Sawyer and The adventures of Huckleberry Finn" to be found under "Clemens, Samuel Langhorne, 1835-1910."

1 cross-reference from "ADVENTURES OF HUCKLEBERRY FINN" to "Twentieth century interpretations of Adventures of Huckleberry Finn" to be found under "Simpson, Claude Mitchell, 1910-."

(5) On the 1st column of page 116 there are 3 title entries for "The adventures of Tom Sawyer and The adventures of Huckleberry Finn."

(6) There are not title entries or cross-references for "Huckle--berry Finn" but if there were they would be found on page 6307 on the top of the 3rd column.

(7) There are no entries or cross-references for "Tom Sawyer." But there are 2 cross-references from "TOM SAWYER, THE ADVENTURES OF" to "The adventures of Tom Sawyer" SEE UNDER "Clemens, Samuel Langhorne, 1835-1910." These are found on page 13327 half-way down th 1st column.

On-Line Microfiche Catalog Requirements:

1 column of entries including the cross-reference from "Twain, Mark" to Clemens, Samuel Langhorne, 1835-1910."

3 columns of entries beginning with "Clemens, Samuel Langhorne..." including all editions of the two works that are being searched.

2 columns of entries beginning with "Adventures..." including the relevant title entries and cross-references found on pages 115 and 116.

1 column of entries beginning with "Tom..." including the relevant cross-references found on page 13327.

1 column of entries beginning with "Huck..." including the section on page 6307 where an entry for "Huckleberry Finn" would be found.

In these experiments, groups of entries from the UC Santa Cruz catalog are identified. For each of them, the associated registry number was obtained from the UCSC printed catalog, and the set of them were used to select entries from the registry file tapes for storage on-line. The set of registry numbers involved, grouped by experiment, are as follows:

Shakespeare's Library

8 8 1 1 5 2 7
8 8 1 7 2 1 9
8 1 1 1 2 1 7
8 1 0 3 9 2 8
9 0 5 9 4 6 3
8 0 4 9 1 8 9
8 0 8 7 9 3 7
8 0 6 4 1 3 4
8 8 3 1 2 4 6
8 0 4 8 0 6 6
8 0 7 4 4 6 9
8 9 0 7 0 2 1
9 0 3 8 7 8 5
0 1 2 7 3 7 5
8 0 4 8 1 3 2
9 0 4 9 7 1 0
9 0 1 4 8 3 3
8 0 4 8 2 3 0
8 0 4 8 0 5 0
8 0 8 6 5 6 5
8 0 4 9 2 6 0
8 8 1 1 5 2 8

Poems

8 8 3 3 6 0 1
8 8 3 3 6 0 2
8 8 3 3 6 0 3
8 0 0 3 7 0 0
8 8 0 5 5 9 2
8 0 4 7 9 3 9
8 9 0 6 2 7 7
8 4 2 4 9 9 6
9 0 6 2 8 3 4
8 0 9 8 8 7 2
8 0 7 8 6 6 5
8 8 1 2 3 2 2
8 0 7 3 8 2 8
8 4 2 2 4 5 2
9 0 1 3 8 7 2
8 0 8 7 9 7 3
8 8 3 3 2 2 5
0 1 3 6 7 5 3
8 8 0 7 5 5 9
8 8 1 7 2 0 3
8 8 3 2 1 8 4

(cont'd next page)

Pacific Computer Conference

8 4 1 1 1 7 1
8 0 2 2 3 7 2
9 0 4 7 5 7 7
8 8 3 8 0 4 2
8 8 3 8 0 4 3
9 0 5 2 9 0 1
0 1 3 6 3 3 5
0 1 4 0 1 1 0
8 8 2 4 2 9 3
8 0 0 9 5 8 8
8 8 3 9 8 3 7
8 8 3 7 6 0 8
8 0 2 4 5 6 1
8 0 8 2 5 7 7
8 0 5 6 4 7 9

DE LA

8 0 2 7 8 5 1
8 4 0 7 3 6 5
9 0 3 2 9 9 7
8 9 0 3 1 1 8
9 0 4 8 5 5 7
9 0 2 6 2 8 9
8 0 3 4 6 3 0
8 8 0 9 8 1 4
9 0 6 2 0 3 0
9 0 2 9 9 2 7
8 1 1 5 3 9 0
9 0 4 3 1 4 4
8 9 0 2 2 8 2
8 0 1 3 7 6 6
9 0 4 8 4 6 2
9 0 5 0 3 0 5
0 1 3 5 0 5 2

Poems (continuation)

8	8	3	0	9	1	5
8	8	0	7	4	2	8
8	1	2	4	2	9	1
9	0	3	9	2	6	9
8	8	3	1	7	8	1
8	1	1	3	8	3	5
8	8	3	1	1	8	5
8	8	3	2	1	3	0
8	0	1	8	7	2	5
8	4	2	2	4	1	7
8	8	2	1	2	1	4
8	1	1	6	4	5	9
8	0	4	8	3	1	9
8	8	2	0	3	2	6
0	1	2	9	0	1	1
8	0	9	8	8	6	3
9	0	4	3	7	8	8
8	0	9	9	7	4	7

University

8	4	1	7	4	8	4
8	0	4	0	5	8	6
8	0	4	1	2	4	7
8	0	2	5	4	1	1
8	0	0	2	2	5	7
8	0	0	8	0	2	6
8	4	1	7	7	6	8
9	0	2	0	2	0	7
8	0	9	2	1	9	3
0	1	2	8	0	1	6
9	0	3	1	3	2	7
0	1	3	9	0	6	8
9	0	6	5	1	3	0
8	4	1	1	4	0	3
8	9	0	2	1	8	7
8	6	3	9	9	0	6
0	1	3	7	0	9	9
8	8	3	8	6	9	0
8	0	0	9	2	9	5
8	0	0	4	6	9	7
8	4	0	1	9	3	3
9	0	0	9	5	6	2
8	0	7	7	6	1	9
9	0	6	7	2	1	7
8	0	1	0	4	3	7
0	1	0	3	2	4	3
0	1	3	8	7	0	6
9	0	1	7	9	8	3
9	0	0	2	6	8	2
9	0	0	4	2	7	3
9	0	3	8	8	4	7
8	8	3	8	7	1	3
9	0	4	6	6	5	0
9	0	3	7	4	1	1
9	0	3	7	9	5	7
8	4	2	6	6	1	5

(cont'd next page)

Saint

8	1	0	3	1	9	0
9	0	2	8	2	0	2
9	0	5	5	5	3	4
8	4	0	9	6	6	9
8	0	1	2	8	6	5
8	0	1	2	8	6	5
8	0	3	2	6	6	7
9	0	1	0	6	0	7
9	0	3	7	6	7	7
8	1	1	9	4	3	7
8	0	8	0	0	4	9
8	0	4	9	3	0	6
8	0	8	1	1	1	4
0	1	3	6	0	6	8
9	0	0	1	5	9	2
8	4	0	7	4	9	0
8	8	3	5	7	4	1
8	8	0	4	7	4	9
0	1	3	2	4	3	3
8	8	2	2	1	4	7
8	8	3	9	2	9	1
9	0	0	8	4	4	8
0	1	0	6	1	3	6
8	0	6	4	0	6	4
8	8	1	1	2	0	4
8	0	5	6	2	7	8
8	8	4	3	8	1	7
9	0	4	9	0	2	4
9	0	3	4	6	2	1
9	0	3	9	2	0	6

John

8	4	2	6	3	8	4
8	4	2	6	3	0	7
8	0	2	2	6	7	0
8	0	9	9	6	1	3
9	0	1	8	8	4	4
8	1	0	3	2	3	2
8	0	0	2	7	2	5
9	0	3	0	1	9	7
9	0	2	3	7	4	0
8	0	9	6	0	7	0
0	1	4	1	9	5	8
8	9	0	4	2	8	6
8	0	3	3	0	4	7
8	0	5	3	1	5	7
8	0	3	2	7	8	5
8	0	7	9	2	6	5
8	0	3	2	7	8	4
8	0	3	2	7	8	6
9	0	5	5	3	0	3
8	0	1	5	7	6	2

University (continuation)

8	0	0	2	2	5	2
8	8	4	1	0	9	2
8	0	8	1	7	4	4
9	0	2	1	4	4	4
8	4	1	7	9	7	4
9	0	6	6	1	8	2
8	0	1	8	1	8	2
8	8	4	5	0	3	7
8	8	4	4	1	1	3
8	1	2	6	3	7	7
9	0	6	3	2	4	5
8	1	1	0	0	3	8
8	1	1	0	0	3	8

La Cruz

8	4	2	7	0	7	5
9	0	5	2	5	6	9
8	8	1	3	9	4	1
8	4	0	3	4	4	7
0	1	2	9	7	4	3
9	0	3	7	0	6	7
8	0	3	6	6	4	8
9	0	1	9	5	7	0
9	0	2	4	1	8	5
8	4	2	6	5	4	8
9	0	4	8	2	6	9
8	4	2	5	7	8	4
8	8	1	3	4	7	4
8	9	0	7	2	5	4

Alberta

8	8	3	6	3	8	7
9	0	1	0	4	4	5
8	4	0	7	6	9	2
9	0	0	5	5	6	2
9	0	2	4	7	4	5
8	1	1	8	2	5	6
8	0	9	7	0	0	5
9	0	3	4	9	7	2
8	0	6	3	7	9	2
8	4	2	4	7	2	2
8	0	4	2	8	1	2

Morgan

0	1	3	3	9	5	7
8	4	1	4	1	0	8
9	0	1	1	1	4	9
9	0	1	3	9	5	2
8	1	0	5	7	0	7
8	1	2	3	2	9	9
9	0	0	3	8	3	6
9	0	0	6	7	0	0
8	1	1	4	5	3	8
9	0	0	0	7	3	6
8	0	9	2	0	6	1
8	0	9	5	9	6	0
8	4	1	0	2	2	1

Juan

8	8	1	1	8	4	0
9	0	4	5	1	2	9
9	8	0	0	5	7	4
9	0	2	7	7	4	9
8	0	2	7	6	9	7
8	0	9	8	9	1	3
8	8	1	2	9	1	8
9	1	2	4	2	9	1
8	4	2	4	9	9	6
8	1	1	7	0	9	8
8	0	0	3	5	5	6
0	1	2	7	3	3	7
9	0	1	9	1	5	9
8	1	2	1	7	2	7
8	8	0	0	5	6	5
9	0	3	4	6	2	1

Twain

8	0	0	2	9	0	9
8	0	5	1	8	5	3
0	1	3	3	6	0	4
9	0	2	9	2	3	7
8	0	0	1	4	0	3
8	8	1	8	4	8	8
0	1	3	9	0	6	0
8	4	2	1	7	5	4
9	0	6	6	0	3	7
8	0	1	4	7	1	6
8	0	2	4	6	8	2
8	1	1	8	3	1	8
0	1	4	1	9	2	7
8	1	2	6	9	7	4
8	9	0	5	5	9	2

Lipton

8	0	9	6	2	0	5
8	8	3	5	7	7	1
9	0	0	9	1	2	0
8	0	9	6	6	2	3
8	0	3	9	1	4	7
8	0	3	8	8	2	9
8	0	3	9	9	9	7
9	0	6	0	1	2	3
8	0	9	6	2	0	5
9	0	6	9	5	9	4
9	0	5	4	0	3	7
8	8	2	3	9	7	7
0	1	0	0	7	8	2
8	0	3	2	2	9	3
9	0	1	4	9	8	9
0	1	2	8	4	0	9

Proceedings

8	1	1	2	7	4	8
0	1	2	7	1	1	9
9	0	0	9	4	2	2
9	0	1	5	1	2	9
8	1	2	5	2	2	0
8	9	0	3	4	6	2
8	1	2	5	0	7	6
8	0	3	4	5	6	5
9	0	1	1	9	9	9
0	1	2	8	7	2	2
8	0	9	8	4	1	8
0	1	3	6	3	3	5
8	8	2	4	7	1	3
8	1	1	4	9	8	4
8	0	0	9	5	8	8
0	1	0	0	9	1	2
9	0	5	7	4	9	6
9	0	0	0	5	7	8
8	0	0	5	4	2	4
8	9	0	1	7	4	9
9	0	4	6	1	8	2
8	8	0	5	3	3	7
8	8	3	7	6	4	6
8	0	9	9	1	0	0
0	1	4	1	0	7	8
9	0	4	5	7	1	7
8	4	0	3	0	9	6
9	0	0	6	2	5	8

Conference

9	0	1	5	5	0	2
0	1	3	3	4	7	8
0	1	3	3	4	7	8
8	1	2	6	6	3	3
8	1	1	9	2	0	4
8	1	2	6	6	3	3
9	0	5	4	2	9	2
8	4	2	7	6	5	1
9	0	6	7	3	8	4
8	1	0	8	5	7	8
8	9	0	4	0	1	4
9	0	5	4	7	4	1
9	0	3	7	8	8	2
0	1	0	1	7	0	5
8	8	4	2	8	9	7
8	8	2	0	7	5	5
8	8	2	0	7	5	5
8	0	0	1	8	1	3
8	1	2	7	1	9	1
0	1	3	3	4	8	7
9	0	1	2	1	7	5
8	0	2	4	2	3	6
8	0	2	4	2	3	6

Clemens

0	1	2	7	4	5	6
8	8	1	0	8	2	0
8	0	5	1	8	3	3
8	8	0	6	0	1	0
8	9	0	1	6	4	4
0	1	0	5	8	4	0
8	0	0	1	5	9	1
0	1	3	2	7	6	0
8	8	3	3	3	4	8
8	4	2	1	5	7	8
9	0	5	3	3	1	2
8	4	0	5	3	6	3
8	8	0	5	1	4	2
8	8	3	3	3	4	0
8	8	3	3	3	3	7
8	0	5	1	8	1	1
8	0	5	1	8	1	4
8	8	3	3	3	3	8
8	0	1	9	8	8	1
8	0	5	1	8	1	6
0	1	3	0	6	4	9
8	8	3	3	3	4	6
8	8	3	8	1	4	7
8	8	3	3	3	3	5
8	0	6	9	4	5	2
0	1	3	2	7	6	0
8	0	5	1	8	0	8
8	8	3	3	3	2	9
8	1	1	2	6	8	2
8	0	5	1	8	1	7

(cont'd next page)

Clemens (continuation)

8	8	3	3	3	4	1
8	0	9	6	8	2	0
8	1	0	0	0	9	4
8	0	5	9	2	3	3
9	0	2	1	8	9	2
8	0	8	0	2	4	1
9	0	3	0	5	6	1
8	8	3	3	3	2	1
8	4	1	0	5	0	1
8	8	3	3	3	9	1
8	0	5	0	8	1	9
8	8	3	3	3	4	2
8	0	5	1	8	2	0
8	8	0	2	3	8	8

Adventures

8	8	3	4	[illegible]	6	4
8	8	3	2	[illegible]	[illegible]	4
0	1	0	5	4	[illegible]	3
8	8	1	7	2	[illegible]	9
8	0	4	9	2	3	0
0	1	2	6	6	1	7
8	8	4	1	2	8	8
9	0	5	6	3	2	9
8	0	5	1	8	1	5
8	0	8	5	3	4	7
8	8	3	3	3	3	7
8	0	5	1	8	1	1
9	0	4	1	3	7	2
8	0	2	8	1	3	4
8	1	0	2	6	5	7
8	8	0	2	9	3	2
8	1	0	8	9	7	7
8	8	3	3	3	5	6
8	0	9	5	9	3	2
8	4	0	4	7	4	5
8	8	0	0	7	3	9
8	8	3	2	8	6	3
8	0	5	1	8	1	4
8	8	3	3	3	3	8
8	0	1	9	8	8	1
8	0	5	1	8	1	5
8	0	0	8	8	9	3
8	0	2	4	6	4	5
8	0	3	4	2	8	2
8	8	1	7	9	8	2
8	0	0	7	3	8	0
8	1	2	4	3	9	6
9	0	0	4	2	1	4
8	4	0	7	2	4	9
8	0	8	5	1	2	8
8	0	2	4	0	1	2
8	0	9	4	9	4	4
8	0	5	6	1	0	5
8	0	1	4	5	3	2
9	0	5	4	6	8	2

Huck

9	0	0	7	5	8	1
9	0	2	1	2	0	1
8	0	1	0	9	4	4
8	0	5	8	7	2	2
9	0	6	3	7	4	2
0	1	2	9	4	9	0
8	0	5	8	7	2	3
8	0	3	1	1	4	0
9	0	1	5	7	7	3
9	0	5	4	1	4	6
9	0	2	4	4	0	7
8	4	1	4	8	8	7

Hazlitt

8	4	1	1	2	8	6
8	8	2	5	2	8	2
9	0	6	2	4	1	3
8	8	1	6	2	7	5
8	8	4	0	2	2	8
8	0	9	4	8	0	4
8	0	9	4	9	5	0
9	0	1	9	7	5	9
8	0	7	3	8	3	4
8	4	1	4	8	8	6
0	1	3	3	2	7	2
8	0	1	5	6	5	4
8	0	8	1	0	0	3
8	0	8	1	2	9	5
8	0	2	2	3	4	0
9	0	1	4	1	1	0
8	0	1	6	0	4	8
8	4	0	0	2	7	4
9	0	3	9	1	2	0
9	0	3	2	9	3	1
9	0	6	7	7	2	1
8	0	6	9	4	5	7
8	4	0	6	2	7	5
8	4	0	6	2	7	3
8	4	0	6	2	7	4
8	0	6	9	4	5	8
8	0	6	7	7	2	8
8	0	6	7	7	2	6
8	0	6	7	7	2	9
8	8	0	0	6	9	5
9	0	2	3	7	4	4
9	0	3	7	3	2	4
8	0	9	8	9	1	1
8	8	3	8	3	5	7
9	0	1	3	4	0	5
8	8	3	0	6	7	7
8	0	4	8	1	4	2
8	8	3	1	2	4	6
8	8	1	2	2	6	9
9	0	1	3	4	0	6
9	0	1	3	4	0	8

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Hazlitt (continuation)

9	0	1	3	4	0	1
9	0	1	1	7	1	8
9	0	1	3	4	0	5
9	0	1	3	4	0	8
9	0	1	3	3	4	0
9	0	1	3	4	0	7
9	0	1	1	7	1	9
9	0	1	3	4	0	0
9	0	1	3	4	0	0
8	0	7	7	7	1	6
9	0	2	3	3	0	0
8	0	2	7	7	6	6
8	0	5	2	5	4	3
8	0	5	2	8	7	1
9	0	2	4	6	1	6
8	1	0	1	8	8	5
8	4	2	5	5	0	1
9	0	4	3	9	0	1
9	0	2	0	2	9	5
8	1	1	3	9	3	6
8	0	9	7	9	0	9
0	1	0	4	4	3	1
8	0	9	0	0	3	3
9	0	3	4	1	1	4
9	0	4	4	5	7	0
8	1	1	3	0	8	2
8	8	0	6	7	2	1
8	0	3	5	7	9	1
9	0	6	2	2	2	9
9	0	6	2	2	2	8
9	0	6	2	2	2	7
0	1	3	4	1	3	1